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**Enbridge Line 6B MP 608 Pipeline Release
Marshall, Michigan**

**Permanent Recovery of Submerged Oil and Oil-Contaminated
Sediments at Priority Locations**

Submerged Oil Recovery Summary Report

**Enbridge Energy
October 29, 2010**

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Sediments at Priority Locations**

Submerged Oil Recovery Summary Report

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**Enbridge Energy
October 26, 2010**

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Figure 1 Submerged Oil Field Observation Flowchart

1.0 INTRODUCTION

A Submerged Oil Task Force (SOTF) was created on Tuesday, August 24, 2010, to perform field assessment, characterization, and mapping of submerged oil impacts in surface water and sediments of Talmadge Creek, Kalamazoo River, and Morrow Lake (Talmadge Creek to Kalamazoo River to River Mile Post [RMP] 40). The SOTF scope was later expanded to include field operations management and data reporting. The SOTF is comprised of representatives from the United States Environmental Protection Agency (USEPA), the Michigan Department of Natural Resources and the Environment (MDNRE), Stakeholders, Enbridge, and their contractors.

As a result of the initial qualitative field assessments, 34 sites in the Kalamazoo River had been identified as potentially containing accumulations of significant amounts of submerged oil in river sediments. These 34 sites with associated USEPA priority assessment and setting/description are listed in USEPA letter dated September 13, 2010 entitled *USEPA Notice of Conditional Approval with Modifications of Enbridge Energy, Limited Partnership's September 3, 2010 submission in response to the Removal Administrative Order issued by USEPA on July 27, 2010, pursuant to §311(c) of the Clean Water Act in Docket No. CWA 1321-5-10-00*.

These 34 sites were further investigated, and 18 were identified as high priority areas and were recommended for submerged oil recovery by the SOTF. A combined total of 27 sites including the 18 oil recovery areas were also subjected to an ecological habitat assessment(s) by the START Contractor on behalf of the USEPA and by Tetra Tech on behalf of Enbridge. The USEPA START Contractor ecological assessment included 22 sites. The Tetra Tech' ecological assessment included an additional 5 sites. These assessments intended to classify each site's ecological use and value to help guide cleanup operations. The SOTF discussed the USEPA START Contractor's assessment in conjunction with possible cleanup approaches, and in a September 21, 2010 memorandum the Task Force Leaders provided recommendations for submerged oil removal for these 18 priority areas. The status of the other 16 sites is described in Section 2.4 of this report.

In addition, Talmadge Creek was not originally included in the Task Force Leaders memorandum. Field assessments were conducted along the entire 2 miles of Talmadge Creek to identify areas of submerged oil. These assessments identified areas in the creek that were candidates for submerged oil recovery using similar recovery techniques recommended by the Task Force Leaders for the 18 primary submerged oil recovery locations on the Kalamazoo River.

The purpose of this Submerged Oil Recovery Summary Report is to describe the results of submerged oil recovery at each of the oil recovery locations and any additional sites that were identified utilizing the recovery techniques recommended by the Task Force Leaders.

2.0 SITE HISTORY

The Line 6B release was reported on July 26, 2010. The oil flowed over land for approximately 1,000 feet where it entered Talmadge Creek and was transported approximately two miles to the confluence with the Kalamazoo River. After entering the Kalamazoo River the oil traveled to Morrow Lake. The distance from the confluence to the dam at Morrow Lake is approximately 40 river miles. At the time of the Line 6B release the Marshall, Michigan vicinity experienced an approximately 25-year storm event (4% chance of occurrence per annum). The increase of the river's elevation varied from between 7 to 9 feet. This 25-year storm event resulted in over wash of the Kalamazoo River's banks, which resulted in the transport of oil onto the river's floodplain.

During the initial response actions, a number of anthropogenic structures (i.e., silt curtains, gabion baskets) were placed in the river. These installed anthropogenic structures as well as the existing structures such as Ceresco Dam create preferential depositional areas in the river system. In addition to anthropogenic structures such as the Ceresco Dam, the Kalamazoo River has natural accumulation points such as islands, sandbars, etc. The SOTF recognized the potential influence of these structures and has mapped them and identified sampling locations in their vicinity. A plan was developed to implement a phased approach to investigate the assessment characterization and mapping of submerged oil impacts to the Kalamazoo River and Morrow Lake. The Qualitative Assessment information (for locating visible oil impacts) was initially collected and then a Quantitative Assessment was initiated to obtain further information on the nature and extent of oil impacts that can be used as a foundation for risk-based evaluations (e.g., comparisons to ecological screening benchmarks with the incorporation of site-specific conditions).

The oil released from Line 6B was a crude oil with an American Petroleum Institute (API) gravity of 11. API gravity is a measure of how heavy or light petroleum liquid is compared to water. If its API gravity is greater than 10, it is lighter and floats on water; if less than 10, it is heavier and sinks. API gravity is thus an inverse measure of the relative density of petroleum liquid and the density of water. The oil partitioned into various phases when it came into contact with the surface water and sediments. The phases that float have been collected from the water surface. The phase that is non-floating is referred to as submerged oil due to its heavier density which caused this material to sink and move through the system below the surface of the river. An unknown amount of the submerged oil was transported and deposited in the Kalamazoo River and Morrow Lake system prior to the installation of near-term containment measures in the river.

2.1 Synopsis of Submerged Oil Assessment

As described in the Supplemental Modification to the Response Plan for Downstream Impact Area (RPDIA) for Continuing Near-Term Containment of Submerged Oil & Oil-Contaminated Sediment submitted September 6, 2010, to address the August 27, 2010, directive received from the USEPA, the identification and prioritization of oil deposition areas for sampling and near-term containment were evaluated.

The Qualitative Assessment was a reconnaissance effort to quickly identify areas with the presence of submerged oil, identify depositional areas, prioritize sites based on a relative comparison of impacted sites, and obtain information on the depositional/erosional characteristics of geomorphic settings in which the impacted sites were identified. This was accomplished by an initial visual assessment followed by in-channel sediment poling, which consisted of inserting a graduated metal pole equipped with a foot disk, into the sediment and

recording visual evidence of oil, sheen (light, moderate, or heavy), droplets, globules, and/or tar balls after the sediment was agitated. A description of light, moderate, and heavy sheen observations is represented in Figure 1 – Submerged Oil Field Observation Flowchart. Each poling location was located by GPS, with the elevation of the water surface, depth of water, top of sediment, and depth of soft sediment recorded. Both the visual assessment and the poling results at over 4,000 locations were documented in field logs. The qualitative poling results of several sites such as RMP 5.55 North, RMP 27.9 and RMP 33.25 was not indicative of the visual field observations made that warranted these sites to be designated as priority sites. The primary criterion for prioritizing sites for quantitative sampling was the visual presence of oil in the qualitative phase. These areas were identified by the Tetra Tech field scientists and then verified by USEPA. Depositional areas of the river were mapped and targeted for sampling during the quantitative sampling program.

In addition, the qualitative teams continued poling transects where the river morphology changed to obtain representative cross-sections of the river. The quantitative teams collected over 500 sediment cores where oil was observed, in addition to defining the extent of depositional environments. These criteria were developed by the members of the SOTF that included participation by USEPA, MDNRE, and Enbridge.

The characterization/sampling activities were guided by the data presented by the Shoreline Cleanup Assessment Teams (SCAT) sediment, and water sampling teams. The geomorphology approach uses multiple lines of evidence to better inform the selection of sample locations and mapping of geomorphology polygons. The SCAT data, sediment sampling, and water sampling information were lines of evidence used to select the focused sample locations.

The field technicians did not encounter submerged oil at any location present as free product pooled in the river. The submerged oil encountered was present in residual quantities as globules or flakes in the sediment, or sheen present on the water surface. The submerged oil was present in the top 4 inches of the sediment as determined from logging over 500 sediment cores collected using hand sampling techniques in the priority locations where poling confirmed the presence of heavy amounts of submerged oil. The sediment cores were logged by scientists working in a field laboratory configured for the purpose of identifying visible oil present in the sediment. The submerged oil present in the footprint of the priority locations is approximately 0.02 to 2 percent of the estimated volume of crude oil released. This estimated volume has been assessed by making general assumptions based upon the information obtained in performing the assessment, characterization, and mapping scope of work required by the USEPA Amended Order.

2.2 Description of Priority Sites

The locations below were defined by the SOTF as “priority sites” and identified by the SOTF for permanent oil recovery:

1. RMP 5.55 North - Upstream of Ceresco Dam
2. RMP 5.63 South - Cove Upstream of Ceresco Dam
3. RMP 5.75 North and South - Ceresco Dam
4. RMP 7.75 - Overflow Channel
5. RMP 12.5 - Oxbow
6. RMP 14.75 - Overflow Channel
7. RMP 15.25 - South Mill Pond
8. RMP 15.5 - North Mill Pond

9. RMP 21.5 - Oxbow
10. RMP 26.0 - Backwater Cove
11. RMP 26.25 - Cutoff Channel
12. RMP 26.65 - Cove
13. RMP 27.9 - Meander with Depositional Bar
14. RMP 28.25 - Oxbow
15. RMP 33.0 - A and B - Backwater Channels
16. RMP 33.25 - Backwater Channel
17. RMP 36.25 - Cutoff Meander
18. RMP 36.5 to 37.5 - Morrow Lake Delta

These 18 sites are described in detail in the Attachments. The information provided for each oil recovery location, which includes figures presenting site features, was developed to better understand site-specific characteristics for the implementation of the recommended oil recovery techniques.

In addition, new moderate and low priority submerged oil locations identified during refined poling activities were brought to the SOTF for consideration of containment and removal activities. Site Summaries, as prepared for the priority oil recovery sites, were developed for these newly identified sites. Once the SOTF concurred with the findings and recommendations these new sites were addressed through the removal of submerged oil and/or oil-containing sediment following the protocols developed in the USEPA approved Work Plan.

The newly identified locations for permanent oil recovery included:

1. Talmadge Creek – (Source Area to I-69, I-69 to 15 ½ Mile Road, and 15 ½ Mile Road to the Confluence of the Kalamazoo River)
2. RMP 5.8 North and South - (Downstream Pools Adjacent to Ceresco Dam)

The total number of sites designated as priority sites completed for submerged oil recovery was 23. These 23 sites are described in detail in the tabbed subsections and include documentation for each individual oil recovery site including the USEPA and Enbridge signed Submerged Oil Remediation Status Tracking Forms, Site Summaries, Pre- and Post- Submerged Oil Recovery Figures, and Pre- and Post- Submerged Oil Recovery Photographs.

2.3 Nature and Extent of Submerged Oil and Oil-Contaminated Sediments at the Oil Recovery Locations

Qualitative and quantitative assessments as well as preliminary ecological assessments were completed for the 18 oil recovery locations. As a result of the Task Force Leaders recommendation memorandum, 9 of the 18 oil recovery locations, identified as requiring oil removal efforts (RMP 7.75, 14.75, 26.0, 26.25, 26.65, 27.9, 28.25, 33.0, and 33.25), were described as having limited habitat and/or ecological value. Appendix A provides the Ecological Assessment Summary Information of 22 sites prepared by the USEPA START Contractor. The Task Force Leaders recommended action at these ten locations was “reasonably aggressive steps be taken to remove the oil.” The recommended techniques for oil removal in these ten oil recovery locations relied primarily on sediment aeration, but also include sediment skimming, flushing, raking, or a combination of all. A Standard Operating Procedure (SOP) for Submerged Oil Recovery was developed and implemented for these oil recovery locations. Appendix B provides the SOP.

The other nine locations (RMP 5.55, 5.63, 5.75, 12.5, 15.25, 15.5, 21.5, 36.25, and 36.5 to 37.5) were identified as having high ecological and habitat values.

Three of these locations (RMP 5.55; 5.63; and 5.75) are located in the vicinity of the Ceresco Dam. The Ceresco Dam area sediments were considered heavily oiled and due to earlier response efforts (such as the cutting of oiled vegetation) the ecological setting of this area has been impacted. Based on the impacted ecological setting the Task Force Leaders recommended dredging in this area. Ceresco Dam dredging is discussed in Section 6.0 of this document.

Locations RMP 12.5, 15.25, 15.5, 21.5, 36.25; and 36.5 to 37.5 (also known as Morrow Lake Delta) were considered to be unique habitat based on the preliminary ecological assessment. The Task Force Leaders recommended that either no action or less aggressive remediation steps be undertaken such as cautiously raking and flushing to avoid damage to the existing flora and fauna. Less intrusive and controlled submerged oil removal measures were completed at locations RMP 12.5, 15.25, 15.5, 21.5, and the Morrow Lake Delta. In addition, the Task Force Leaders recommended that the outlet booms at these locations be removed and downstream collection be adequately maintained to capture potential releases of oil during oil recovery efforts. This was accomplished.

All priority sites that have been signed off by USEPA and Enbridge will be inspected by the Operations and Maintenance branch to determine whether additional maintenance and monitoring is required. After these site visits are complete, the Operations & Maintenance Inspection Tracking spreadsheet will be updated to allow entry of any of these sites into the Operations and Maintenance program that warrants further monitoring.

2.4 Status of Other Submerged Oil Locations

Several special SOTF meetings were held outside of the regularly scheduled meetings to specifically discuss the initial qualitative field assessments of each of the 33 sites in the Kalamazoo River that were identified as potentially containing accumulations of significant amounts of submerged oil in river sediments. These several discussions resulted in the identification of the 18 recovery oil locations described as "priority sites".

It is important to note that that 2 of the 33 sites were combined into 1 site designated as Morrow Lake Delta. The River Mile Location and Setting/Description used in the USEPA letter dated September 13, 2010 for these combined sites are:

1. RMP 36.5 to 36.75 – Overflow Channel
2. RMP 37 to 37.5 – Braided

The other 14 locations were identified by the SOTF as sites that did not require permanent oil recovery by the October 31, 2010 deadline for removal of submerged oil and oil-contaminated sediments. These locations are listed below based on the same River Mile Location and Setting/Description used in the USEPA letter dated September 13, 2010:

1. RMP 7.0 South – Overflow Channel
2. RMP 15.0 – Secondary Channel
3. RMP 22.75 – Cutoff Channel
4. RMP 27.75 – Bridge Backwater
5. RMP 30 – Northeast Inlet

6. RMP 30.25 – Inlet on North Bank
7. RMP 30.25 South – Small Inlet on North Bank headed Northeast
8. RMP 33.5 – Wide River Channel
9. RMP 34 – Upstream of Bridge
10. RMP 35.75 / 36 – Wider River Channel
11. RMP 36 – Cutoff Channel
12. RMP 37.75 North and South – Islands
13. RMP 39.75 North – Upstream of Dam
14. RMP 39.75 South – Upstream of Dam

Based on the qualitative and quantitative assessments of these 14 locations, the SOTF determined that the amount of known or suspected submerged oil present at these locations did not have a high probability of remobilization and therefore submerged oil recovery was not required. At RMP 15.0, Division C crude oil clean-up personnel started oil removal at this location followed by SOTF completing removal activities as part of RMP 15.25 South Mill Pond. Enbridge Operations will conduct a site visit to assess and determine the most feasible course of action for these 13 sites (not including RMP 15.0) as well as the priority oil recovery sites and other additional sites having moderate to low priority submerged oil.

An inclusive list of submerged oil sites identified by the SOTF was created that includes the 23 submerged oil recovery sites (18 original priority sites, 3 Talmadge Creek sites, RMP 5.8 North and RMP 5.8 South) and the 14 sites that were determined by the SOTF not to require submerged oil removal. In addition 92 candidate area sites were identified and evaluated by SOTF and determined not to require removal action based upon visual observations and / or qualitative assessment(s). The list of 129 submerged oil sites includes GPS coordinate locations of the sites, a description of the area, and a SOTF recommendation for monitoring. This inclusive list of submerged oil sites is included in this report as Appendix C Submerged Oil Sites – Operation and Maintenance Inspection Tracking.

The Enbridge Operations assessment will determine containment requirements, maintenance codes, inspection frequency, and priority code reassessment. After the site visits are complete, the Operations & Maintenance Inspection Tracking spreadsheet will be updated to allow entry of the additional sites that require monitoring into the Operations and Maintenance program.

3.0 OIL REMOVAL ACTIVITIES

3.1 Mobilization and Site Preparation

Key personnel and equipment were mobilized to each oil recovery location. Personnel received Enbridge's site-specific training. Training addressed implementing health and safety, traffic control, spill prevention, and other relevant topics. In addition, all personnel are 40-hour HAZWOPER trained in accordance with OSHA CFR 29 1910.120. Sorbent boom were deployed to cover the shoreline perimeter prior to the start of sediment aeration activities. Hard boom were deployed along open channel areas. Additional sorbent material was deployed in areas within a specific oil recovery location that contain identified sensitive habitat

An initial conditions assessment was conducted by Tetra Tech for the oil recovery locations to identify areas where submerged oil and oil-contaminated vegetation were located. The assessment was conducted as part of the early response characterization activities to identify areas of "high priority" throughout the river system. The assessment included visual

observations of sheen on the water surface, poling to identify submerged oil, and sediment core collection and logging to identify visible oil in the sediment column.

As presented in the SOP, the objective of the aeration process was to sweep the oil recovery areas until there was “no discernable oil present on the surface.” Enbridge notified the USEPA upon completion of an oil recovery location that met this criteria followed by a two-day “rest” period to allow for site conditions to settle. Enbridge then scheduled an inspection for a USEPA representative at each oil recovery location for; review, photo documentation, and if no discernable oil was present, final sign off.

Once recovery of submerged oil operations was completed and the site was signed off by USEPA and Enbridge representatives, a post-sediment aeration conditions assessment was performed by Tetra Tech. This assessment followed the same procedures used for initial site assessment. Tetra Tech compared the initial and post-recovery conditions results to determine the effectiveness of the oil removal effort. These results are provided in the Final Completion Report.

3.2 Oil Removal by Sediment Aeration, Raking, Flushing

Sediment aeration was performed using a pond aeration unit with electric motor (explosion proof) with an aluminum impeller. The pond aerator uses a 2.5 foot by 4 foot floatation device. A diffuser panel was required at water depths less than 4 feet. The pond unit was operated from an airboat outfitted with a platform deck. A grid system creating “cells” was developed during site preparation activities. Each grid area of work cells was approximately 50 feet of linear runs from the shoreline to the containment boom, which was dissected if runs were wider than 75 feet. A minimum of two sweeps within each grid cell was specified, but some sites required over 10 sweeps. If there was no discernable oil on the surface after two sweeps, the cell was flagged as completed with a green flag. If the cell required further aeration the cell was flagged with red flags.

In the event that the aeration procedure described above could not be used due to insufficient water depth, the oil recovery location(s) were manually flushed with a high volume, low pressure water stream or raked or a combination of both. These techniques were consistent with recommendations made by the Task Force Leaders in their memorandum dated September 21, 2010. These “Secondary Methods” for oil recovery were presented in the SOP. These processes were repeated until there was no discernable oil visibly released from the cell. In addition, new techniques were developed as necessary and approved by the USEPA to facilitate the recovery of submerged oil. An example was the larger pumps used for flushing the Mill Ponds at MP 15.25 to MP 15.5.

3.2.1 Containment of Oil Recovery Locations

The total areas aerated for each oil recovery location are presented in the Attachments. The areas were contained through the installation of near-term containment measures (i.e., hard boom, X-Tex, or geotextile curtains). These existing containment measures provided overall containment of oil brought to the surface by aeration. The sorbent boom was deployed along the entire shore side perimeter of the work area, and any vegetative area, to prevent spread of contamination. The sorbent boom material deployed during site preparation also served as containment for floating oil, with regular change outs as the boom absorbed oil.

3.2.2 Recovery of Floating Oil

The floating oil was directed to the corner of the boomed containment areas by “leaf blowers” for collection by absorbent materials (i.e., absorbent pads, mops, pompoms, etc.) to collect and remove the recovered oil. Areas that had the lowest ecological complexity (if at all possible) and areas that were easily accessible as the oil collection points were selected in each oil recovery location. The downstream current was also used in the “cells” to direct the floating oil into each collection area.

3.3 Decommissioning and Decontamination

Following completion of sediment aeration activities, personnel, equipment, and materials were removed from the site. Cleaning methods for equipment included brushing and pressure washing as necessary to remove potentially contaminated material. Media from the oil absorbing was disposed off-site following the *Waste Treatment, Transportation, and Disposal Plan*.

4.0 CERESCO DAM DREDGING

The SOTF determined that the Amphibex dredge technology would be used for dredging at the Ceresco Dam Priority Location RMP 5.75 South. In addition, sediment removal activities were completed in Priority Locations RMP 5.55 by aeration and flushing, RMP 5.63 by dredging, RMP 5.75 North (Cells 1 – 7) by aeration, and MP 5.75 Northwest (Cells 8, 9, and 10) by dredging. The purpose of this work was to remove the submerged oil and oil-contaminated sediment.

4.1 Nature and Extent of Submerged Oil and Oil-Contaminated Sediments at Ceresco Dam

Qualitative and quantitative assessments were completed in the vicinity of Ceresco Dam. An area between approximately 2 and 3 acres in size was identified as a high priority location requiring significant removal of submerged oil and oil-contaminated sediments. As a result of SOTF discussions, it was determined that dredging was the preferred methodology to remove these impacted sediments. The depth of impacted sediments ran to approximately 1.5 feet below the mud-line.

4.2 Sediment Removal by Hydraulic Dredging

Dredging was performed using an Amphibex dredge, which is an amphibious excavator hybrid dredge that integrates a hydraulic cutter head dredge with a positive-displacement pump for high-solids dredged material transport. The Amphibex is versatile in its portability by flat bed truck and ability to move over ground, in shallow water, and in deeper water under its own power.¹

¹ In addition to the Amphibex, two other dredges were used to supplemental the work. A small “Mudcat” dredge was used for 10 days in MP 5.63 South. The mudcat was on standby as a contingency dredge in case the Amphibex encountered mechanical problems. A third dredge (Cutterhead) was also used for 7 days in the deeper waters of MP 5.75 Northwest.

The Amphibex is 38 feet long, weighs approximately 50,000 pounds, and is powered by a 250-HP Detroit Diesel engine equipped with a silencing system which allows it to operate at low noise levels. The Amphibex is self-propelled and can sail at 8 knots. It does not require any cables for operation and it is able to move itself utilizing spuds and the bucket. The Amphibex utilizes a unique articulating arm with the dredge pump head mounted to it, allowing 3 dimensions of controlled movement. The dredge head itself is able to rotate in and out much like a bucket on an excavator, which allows for precise placement of the pumping head. The maximum digging radius is approximately 27 feet for 154 degrees. The Amphibex is also unique in its ability to work in any depth of water ranging from dry land operation to 20-feet of depth. It can “walk,” “crawl,” or float to the work area.

By carefully positioning the dredge and utilizing the 3 dimensions of movement, contaminated material was removed in an efficient and safe manner. The Amphibex operator adapted to the many unique situations as they were encountered. Several differing site conditions encountered included:

- Water depth
- Depth of the sediment
- Matrices of sediment
- Plants and Roots
- Debris ranging from logs, branches, stumps, rocks, trash, and other debris (e.g., a brake drum, metal sign posts, etc.)

The approximately 2.5 acre primary area dredged was MP 5.75 South, located along the left descending bank of the Kalamazoo River starting at the Ceresco Dam for approximately 900 feet with a width of 200 feet. The design specification was to remove a lift of six inches of sediment from most of the oil-containing areas. Removing a precise 6-inch layer was difficult using any type of dredging method, therefore 1 to 1.5 feet was removed including an overdredge allowance of 1 foot. Approximately 2 feet of material was removed close to the face of Ceresco Dam. Additionally, sediment removal activities were completed in Priority Locations MP 5.63, and MP 5.75 Northwest.

The material removed with the Amphibex was conveyed hydraulically to Geotubes, which served as the primary method for dewatering. Sediment was removed, working from the shore toward the center of the river, working in 20-foot wide areas, which were marked using a grid system of poles to track progress. Dredging commenced upstream and proceeded downstream to reduce the potential of recontamination of a previously dredged area.

4.2.1 Containment of Dredging Footprint

The overall dredging footprint was approximately 6 acres in size. Although the dredging footprint was contained through the installation of near-term containment measures, sections were bolstered by installing reinforced silt curtains.

4.3 Transfer of Dredged Material

After each of the three pieces of dredge equipment (Amphibex, Mudcat and Cutterhead) were positioned inside the containment area, a slurry transfer piping connection was made at the equipment end and then at the manifold at the Geotubes. Adequate piping attachments were

delivered to the staging area to support the dredging project. Booster pumps were installed and staged on dry land at the near shore area, and used as necessary.

4.4 Dewatering of Sediment

Sediment dredged from the vicinity of the Ceresco Dam was pumped to geotextile tubes for dewatering, situated on a dewatering pad located in the soil handling area. The dewatering pad was approximately 360 feet by 200 feet. The dewatering pad was constructed by compaction of the existing soil base, installation of an impermeable liner, and placing a layer of drainage aggregate as a working surface. Nine Geotubes were used in the dewatering process.

4.4.1 Geotube Operations

The dredged sediment consisted of an approximately thirty to forty percent solids slurry mixture. The mixture was pumped into a header pipe then distributed into a manifold system with valves to direct the flow of the slurry into high strength woven textile Geotubes. This system, located at 13200 12 Mile Road, utilized a flocculent to settle out the solids while a pump was connected to the other end to aid in the removal of water. Once a Geotube was full, flow was diverted to another Geotube while the full Geotube dewatered. Each Geotube went through “fill and rest” cycles until it reached its full capacity as per the manufacture's specifications. Operators continuously monitored the Geotubes during filling and also monitor shrinkage in the Geotubes prior to fill cycles to evaluate the remaining capacity of each Geotube.

Once the Geotube is full of sediment and dewatering is sufficient, the generated sediment will be characterized prior to removal and disposed following the approved plans. At the time this report was issued, the Geotubes were being cut open to allow an excavator to place the sediment into an appropriate transportation container. Depending on the nature of the sediment, the material may be mixed with a drying agent (e.g., fly ash) for appropriate solidification prior to being sent offsite for disposal.

4.4.2 Containment and Collection of Weep Water

The dewatering pad was designed with a berm to contain water. It was designed to slope towards a 30-foot by 65-foot by 5-foot deep sump which represents approximately 72,935 gallons of capacity (one hour of water treatment system capacity). The water drained to the dewatering pad (i.e., weep water) was collected in this sump and treated in an on-site temporary water treatment plant.

4.5 Water Treatment and Discharge

Water collected in the sump was pumped to a water treatment system which included bag filters with oil grabbing bags, oil absorbing pressure vessels (i.e., organoclay cans), and Granular Activated Carbon (GAC) vessels. The treatment system was sized to meet the discharge requirements of <20 parts per billion (ppb) of total benzene, toluene, ethyl benzene, and xylene (BTEX). A MDNRE certified wastewater treatment operator provided operations oversight to assure that the discharge requirements were met per the NPDES permit as follows:

- Total benzene, toluene, ethyl benzene, and xylene (BTEX) - 20 ug/l
- Total Lead for reporting only

- Dissolved oxygen (DO) - 4.0 mg/l minimum
- pH 6.5 S.U. minimum to 9 S.U. maximum

The flow rate ranged between 1,500 and 2,000 gallons per minute (gpm). The flow rate was adjusted manually primarily based on the level of water within the dewatering pad and also the efficiency of the treatment equipment and the number of dredge equipment used.

There were two bag filters arranged in parallel, which utilized fabric filters to physically separate solids and oil from the stream of water. The effluent from the bag filters was passed through a vessel filled with organoclay, which removed additional oil from the water stream. The two oil absorbing vessels were piped in series (lead-lag). The bag filters and organoclay cans acted as a buffer for the GAC vessels, intercepting contaminants that would otherwise foul the GAC filter media and shorten their service life.

The GAC vessels provided tertiary water treatment prior to discharge back to the Kalamazoo River. Two GAC vessels were piped in series (lead-lag) for a single treatment train. Each vessel contained 10,000 pounds of GAC and the series of two vessels were designed to treat 750 gpm. Three treatment trains identified as A, B, and C were connected to operate in parallel to treat between 1,500 and 2,000 gpm with a maximum capacity of 2,250 gpm. The differential pressure across the GAC vessels were monitored for signs of plugging and/or physical fouling due to suspended solids and/or biological growth. Backwash of the bed was initiated when the differential pressure across the vessel reached 15 pounds per square inch, or twice that of a clean bed. The backwash water was returned to the sump for treatment and ultimate discharge.

This treatment plant discharged treated water back to the Kalamazoo River and operated under a NPDES Certificate of Coverage (No. MIG081158) issued by MDNRE. Treated water was continuously discharged in accordance with the NPDES permit. Effluent discharged into the Kalamazoo River used a vertical riser pipe with a dispersion cap. The discharge pipe and vertical riser were mounted to a floating dock approximately 40 feet from shore. The discharge point was monitored daily to confirm no riverbed erosion was occurring. All analytical results confirmed that allowable levels in the NPDES permit were not exceeded. The MDNRE conducted a compliance evaluation inspection of the treatment system on October 5, 2010 with no issues identified.

4.6 Waste Management

Solid waste collected in the Geotubes that was generated during the dredging and dewatering activities will be handled accordance to the USEPA approved Waste Management Plan for Dredging Operations Located at MP 5.75 South, MP 5.63 South, and MP 5.75 Northwest (Cells (8, 9, and 10).

5.0 QUALITY ASSURANCE/QUALITY CONTROL

5.1 QC Monitoring

The overall project objective was the removal of submerged oil and oil-contaminated sediments from the oil recovery locations identified as priority sites and listed in Section 2.2. The oil recovery locations were evaluated for sediment aeration effectiveness by using the quantitative assessment techniques utilized to identify the oil recovery locations in the river. Post-flushing assessment conditions were compared to the pre-flushing assessment conditions and summarized in the final report.

5.2 Inspections by Regulatory Agencies

USEPA developed a written inspection/clearance procedure to guide the evaluation of the effectiveness of permanent oil recovery efforts. Forty-eight hours after the completion of the recovery efforts, agency inspections were conducted following these procedures. These inspections were documented using the Submerged Oil Remediation Status Tracking Form in the Attachments. In addition, a USEPA representative was included as part of each oil recovery work team and thereby present during daily oil recovery activities.

6.0 OIL RECOVERY OPERATIONS

Tabbed subsections that provide oil recovery documentation at the 23 priority sites are included as attachments for each individual oil recovery site, including the USEPA and Enbridge signed Submerged Oil Remediation Status Tracking Forms, Site Summaries, Pre- and Post- Submerged Oil Recovery Figures, and Pre- and Post- Submerged Oil Recovery Photographs.

Based on qualitative assessment results, three sites (RMP 29.15, RMP 30.75, and RMP 37.75 North) were identified as priority candidate areas for removal activities during SOTF discussions. These 3 sites were inspected by USEPA and Enbridge to determine if removal activities were required and concluded that these sites did not warrant removal activities. USEPA and Enbridge signed Submerged Oil Remediation Status Tracking forms are included for these 3 sites as tabbed subsections after the 23 priority sites documentation.

7.0 CONCLUSION

The SOTF has completed the field assessment, characterization, and mapping of submerged oil impacts in sediments of Talmadge Creek, Kalamazoo River, and Morrow Lake (Talmadge Creek to Kalamazoo River to River Mile Post [RMP] 40) as well as field operations management and data reporting.

As a result of the initial qualitative field assessments, 34 sites in the Kalamazoo River identified as potentially containing accumulations of significant amounts of submerged oil in river sediments were further investigated. Eighteen sites were identified as high priority areas and were recommended for submerged oil recovery by the SOTF.

The original 18 sites, as well as 5 newly identified locations, were designated as priority sites requiring submerged oil recovery (total of 23). After initial conditions assessments were

conducted by Tetra Tech, oil recovery activities via aeration, raking, flushing, and/or dredging were conducted until “no discernable oil present on the surface”. USEPA was notified by Enbridge upon completion of an oil recovery location, that met this criteria followed by a two-day “rest” period to allow for site conditions to settle. Enbridge then scheduled an inspection for a USEPA representative at each oil recovery location for; review, photo documentation, and if no discernable oil was present, final sign off.

Once recovery of submerged oil operations was completed and the site was signed off by USEPA and Enbridge representatives, a post-sediment aeration conditions assessment was performed by Tetra Tech. This assessment followed the same procedures used for initial site assessment. Tetra Tech compared the initial and post-recovery conditions results to determine the effectiveness of the oil removal effort.

In addition, sediment removal activities were conducted Ceresco Dam through use of the Amphibex dredge technology, which is an amphibious excavator hybrid dredge that integrates a hydraulic cutter head dredge with a positive-displacement pump for high-solids dredged material transport. The material removed with the Amphibex was conveyed hydraulically to Geotubes, which served as the primary method for dewatering. Sediment was removed, working from the shore toward the center of the river, working in 20-foot wide areas, which were marked using a grid system of poles to track progress. Dredging commenced upstream and proceeded downstream to reduce the potential of recontamination of a previously dredged area. Weep water from the Geotubes was contained on the dewatering pad and conveyed to an on-site temporary water treatment plant. Once water was sufficiently treated in accordance with NPDES permit requirements, it was continuously discharged back to the Kalamazoo River.

**Enbridge Line 6B MP 608 Pipeline Release
Marshall, Michigan**

**Permanent Recovery of Submerged Oil and Oil-Contaminated
Sediments at Priority Locations**

**Submerged Oil Recovery Summary Report
Talmadge Creek - Source Area to the Confluence of the
Kalamazoo River**

Enbridge Energy

EXECUTIVE SUMMARY

A Submerged Oil Task Force (SOTF) was created on Tuesday, August 24, 2010, to perform field assessment, characterization, and mapping of submerged oil impacts in surface water and sediments of Talmadge Creek, Kalamazoo River, and Morrow Lake (Talmadge Creek to Kalamazoo River to River Mile Post [RMP] 40). The SOTF is comprised of representatives from the United States Environmental Protection Agency (USEPA), the Michigan Department of Natural Resources and the Environment (MDNRE), Stakeholders, Enbridge and their contractors.

As a result of the initial field assessments, 34 sites in the Kalamazoo River had been identified as potentially containing accumulations of significant amounts of submerged oil in river sediments. These areas were further investigated, and 18 were identified as high priority areas and were recommended for submerged oil recovery by the SOTF. These 18 priority areas were also subjected to an ecological habitat assessment intended to classify their ecological use and value to help guide cleanup operations. The SOTF discussed the assessment in conjunction with possible cleanup approaches, and in a September 21, 2010 memorandum the Task Force Leaders provided recommendations for oil removal for these 18 priority areas.

Initial Assessment

The Qualitative Assessment was a reconnaissance effort to identify areas with the presence of submerged oil, identify depositional areas, prioritize sites based on a relative comparison of impacted sites, and obtain information on the depositional and erosional characteristics of geomorphic settings in which the impacted sites were identified. This was accomplished by in-channel sediment poling, which consisted of inserting a graduated metal pole equipped with a foot disk, into the sediment and recording visual evidence of oil, sheen (light, moderate, or heavy), droplets, globules, and/or tar balls after the sediment was agitated. Each poling location was located by GPS, with the elevation of the water surface, depth of water, top of sediment, and depth of soft sediment recorded. The primary criterion for prioritizing sites for quantitative sampling was the visual presence of oil in the qualitative phase. These areas were identified by the Tetra Tech field scientists. Depositional areas of the river were mapped and targeted for sampling during the quantitative sampling program.

Talmadge Creek - (Source Area to I 69, I 69 to 15 ½ Mile Road, and 15 ½ Mile Road to the Confluence of the Kalamazoo River)

Talmadge Creek is an approximately 2 mile long narrow creek with a meandering channel. Since the spill, extensive restoration has already been undertaken, including application of containment and absorbent boom, excavation of stream bank soil and vegetation, dewatering, and bank stabilization and off-site disposal of impacted waters, sediments, and soils. Efforts have been made to keep the Creek's geomorphologic structure intact.

Actions

Submerged oil recovery in the creek's sediments, from the source area to Interstate I 69, was accomplished by a 12 man crew raking the creek bed to agitate and resuspend the oil for collection by absorbent boom and pads and with vacuum trucks staged at predetermined collection points. From Interstate I 69 to 15 ½ Mile Road, a 3 man crew was used, but the recovery was completed in a similar fashion with absorbent boom and pads, and vacuum trucks

at collection points. From 15 ½ Mile Road to the confluence with the Kalamazoo, the 12 man crew returned. Oil collection was once again undertaken with absorbents and vacuum trucks.

Outcome

The three sections of Talmadge Creek were visited by USEPA and Enbridge representatives on October 7 and 17, 2010. The USEPA and Enbridge representatives walked the creek along the banks and the work crews disturbed the sediment the rakes, only light sheen was noted on their sign-off documentation, no globules were noted. Talmadge Creek was cleared and received final sign-off (on three sign-off forms).

Attachment Descriptions

The ensuing information listed below directly follows in this Submerged Oil Recovery Summary Report:

- USEPA and Enbridge signed Submerged Oil Remediation Status Tracking Forms.
 - Contains signatory approvals.
- Site Summary
 - Provides information used by the field teams to better understand site specific characteristics of the priority locations and determined the most appropriate recovery technology. Information included site layout, areal extent, depth to water, sediment thickness, sediment bed type, data collected, habitat description and habitat quality, containment measures, access, and recommendations.
- Pre- and Post- Submerged Oil Recovery Figures
 - Presents qualitative pre- and post- poling data in a graphical format.
- Photographs
 - Provides visual documentation of pre- and post- submerge oil recovery activities.

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 9-23-2010

EPA(Rep): John Verlac

ENBRIDGE(Rep): Mike Goman

LOCATION
(Division/Sect/MP)

Talmadge Creek
Source Area to I 69

CLEANUP METHODS USED

Method: raking Notes: 12 man crew raked creek to stir up the trapped oil

Method: Hydro Vac Notes: Treated source areas to division and flume areas downstream of division

Method: _____ Notes: _____

OIL COLLECTION METHODS USED

Method: sorbent boom-collected floating oil/sheen as it appeared, sorbent pads

Method: Vacuum Truck—collected heavier contaminants at collection points

DISCERNABLE OIL
OBSERVED (end of day)

Light sheen

Sheen(heavy, medium, light)

Light sheen in spots

no globules of oil

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): YES

Team Lead: Mike Goman

Remediation Complete
SITE APPROVAL

Name

Signature

Date

EPA:

Paul R. Leonard

Enbridge:

Joe Kackos

[Signature]
0272

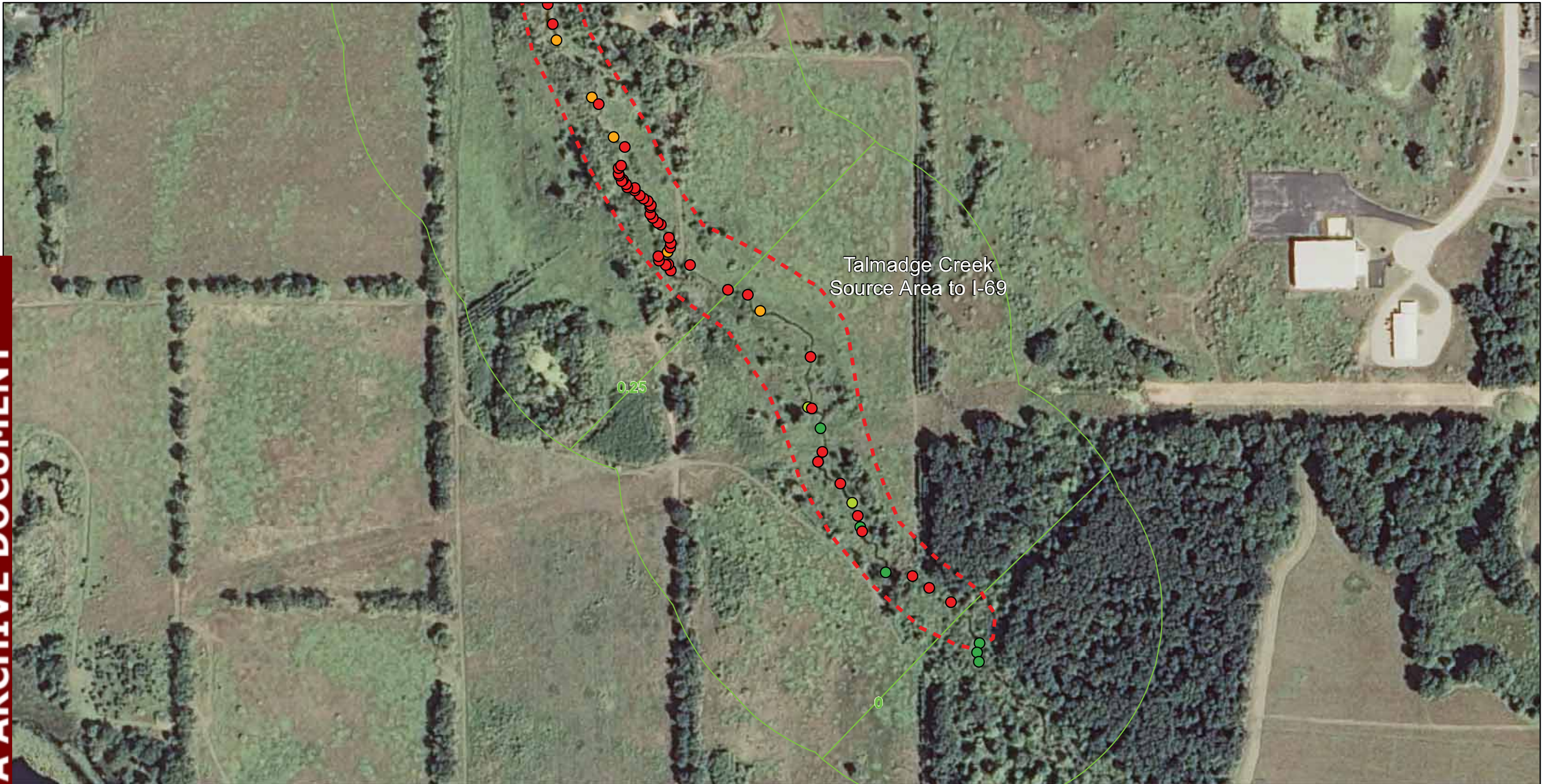
10/17/10

10/17/10

SITE SUMMARY – TALMADGE CREEK

The information provided below shall be used by the field teams to better understand site specific characteristics of the priority locations and determine the most appropriate recovery technology.

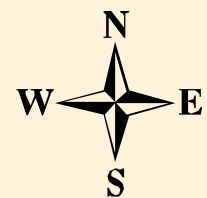
Site Location:	Talmadge Creek
Site Layout:	See Figure Attached
Description and Geomorphic Setting:	Narrow creek with meandering channel
Approximate Areal Extent:	2 river miles
Approximate Depth of Water:	0.0-0.5 feet
Sediment thickness:	0-1 foot
Bed type:	Soft sediment, sand, and gravel
Data Collected:	
Poling (Y/N)	Y
Cores (Y/N)	Y
Lab analysis (Y/N)	Y
Community Description and Habitat Quality:	Refer to Technical Memorandum – Final dated September 23, 2010 to U.S. EPA OSC from Weston Solutions, Inc. START
Containment:	A number of various containment structures and systems
Access Issues:	Not accessible via boat
Miscellaneous:	N/A
Recommendations:	ECO: Per Wetland Assessment Report dated August 2010 by URS Corporation, approximately 2.84 acres of Wetland A will be impacted by excavation activities. This wetland was an emergent and forested wetland associated with Talmadge Creek. SOTF: Extensive restoration already undertaken, including excavation and off-site disposal. Recommend that reasonably aggressive steps be taken to remove the submerged oil. The technique employed would rely primarily on aeration, but may also include sediment skimming, flushing, raking or a combination of these.



Talmadge Creek
Source Area to I-69

0.25

0



0 250 500

1 inch = 250 feet

Legend

Pre Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy
- Observed But Quantity Not Noted

Priority Areas

Submerged Oil Delineation Area

Priority Area Approximate Containment (if known)

Division Quarter Mile Grid

**Poling Data Collected Through:
September 18, 2010**

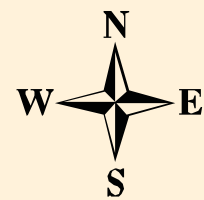
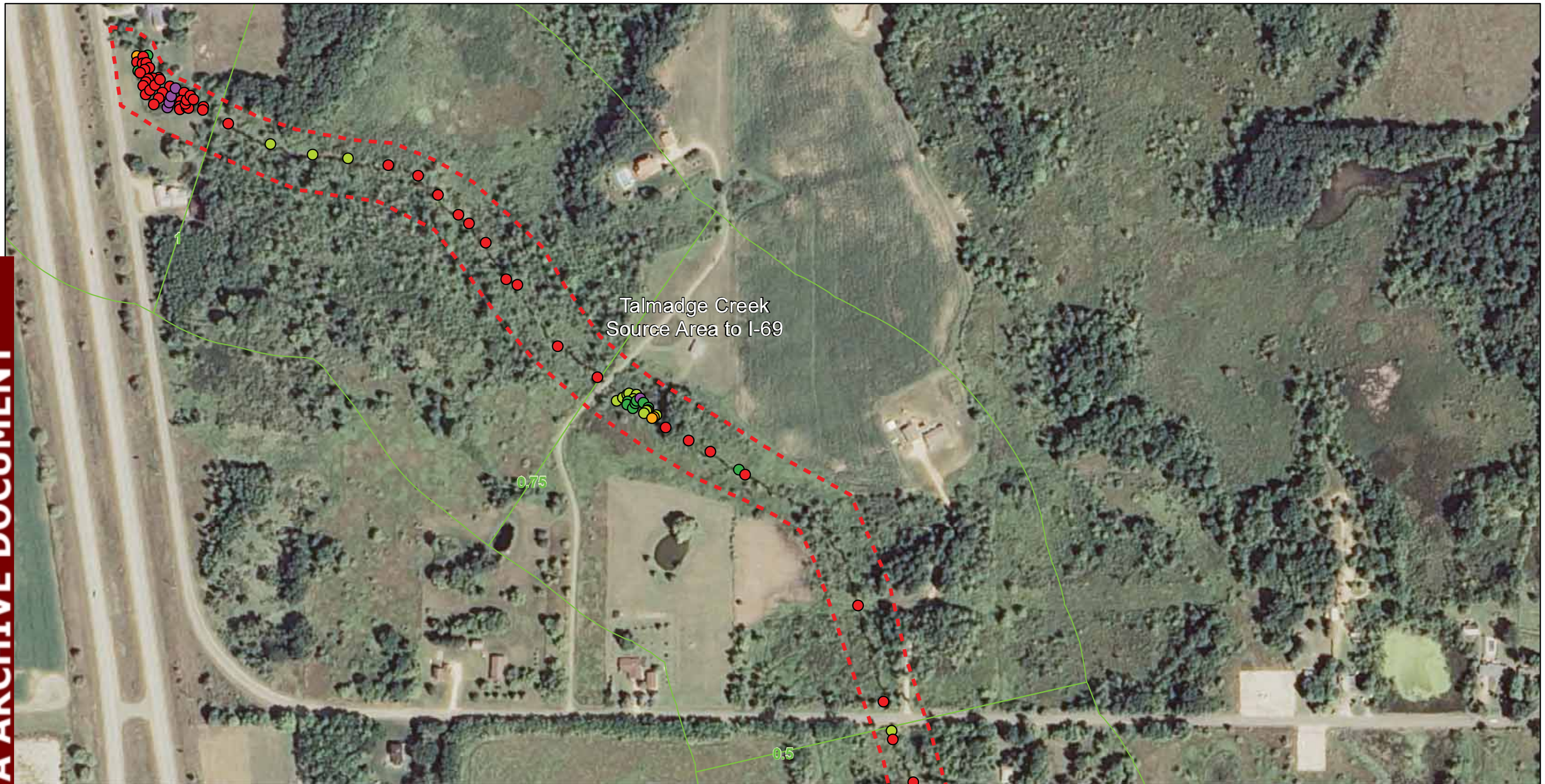
Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA PRE RECOVERY
QUALITATIVE RESULTS**
**Talmadge Creek Source Area to I-69
(MP 0.0 to 0.5)**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 25, 2010





0 250 500
1 inch = 250 feet

Legend

Pre Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy
- Observed But Quantity Not Noted

Priority Areas

Submerged Oil Delineation Area

Priority Area Approximate Containment (if known)

Division Quarter Mile Grid

Poling Data Collected Through:
September 17, 2010

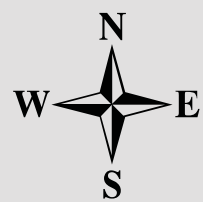
Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA PRE RECOVERY
QUALITATIVE RESULTS**
**Talmadge Creek Source Area to I-69
(MP 0.5 to 1.0)**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 25, 2010





0 250 500

1 inch = 250 feet

Legend

Post Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

**Poling Data Collected Through:
October 23, 2010**

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA POST RECOVERY
QUALITATIVE RESULTS**

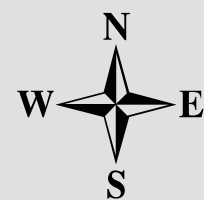
**Talmadge Creek Source Area to I-69
(MP 0.0 to 0.5)**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 26, 2010



TETRA TECH EC, INC.



0 250 500
1 inch = 250 feet

Legend

Post Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

Poling Data Collected Through:
October 24, 2010

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

PRIORITY AREA POST RECOVERY QUALITATIVE RESULTS

Talmadge Creek Source Area to I-69
(MP 0.5 to 1.0)

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 26, 2010



TETRA TECH EC, INC.

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 9-23-2010

EPA(REP): Karen Berecz

ENBRIDGE(REP): Mike Blevins

LOCATION
(Division/Sect/MP) Talmadge Creek
I 69 to 15 1/2 Mile Road

CLEANUP METHODS USED

Method: Raking Notes: 3 man crew raked creek to stir up the trapped oil

Method: _____ Notes: _____

Method: _____ Notes: _____

OIL COLLECTION METHODS USED

Method: **Sorbent Boom**---collected light sheen as it appeared

Method: **Vacuum Truck**---collected the remainder of sheen/ globules at collection point @ 15 1/2 Rd.

DISCERNABLE OIL
OBSERVED (end of day) **NO**

Sheen(heavy, medium, light) no Globules no

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): yes

Team Lead: Mike Blevins

Notes: Observed light sheen while raking and no globules until last 10 to 15 ft. before road. Raking continued until no globules were seen.

Remediation Complete

SITE APPROVAL

Name

Signature

Date

EPA:

ROSE NEGRON

[Signature]

10/7/2010

Enbridge:

Scott SWIECH

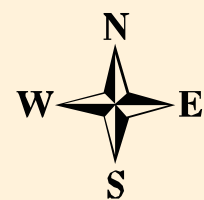
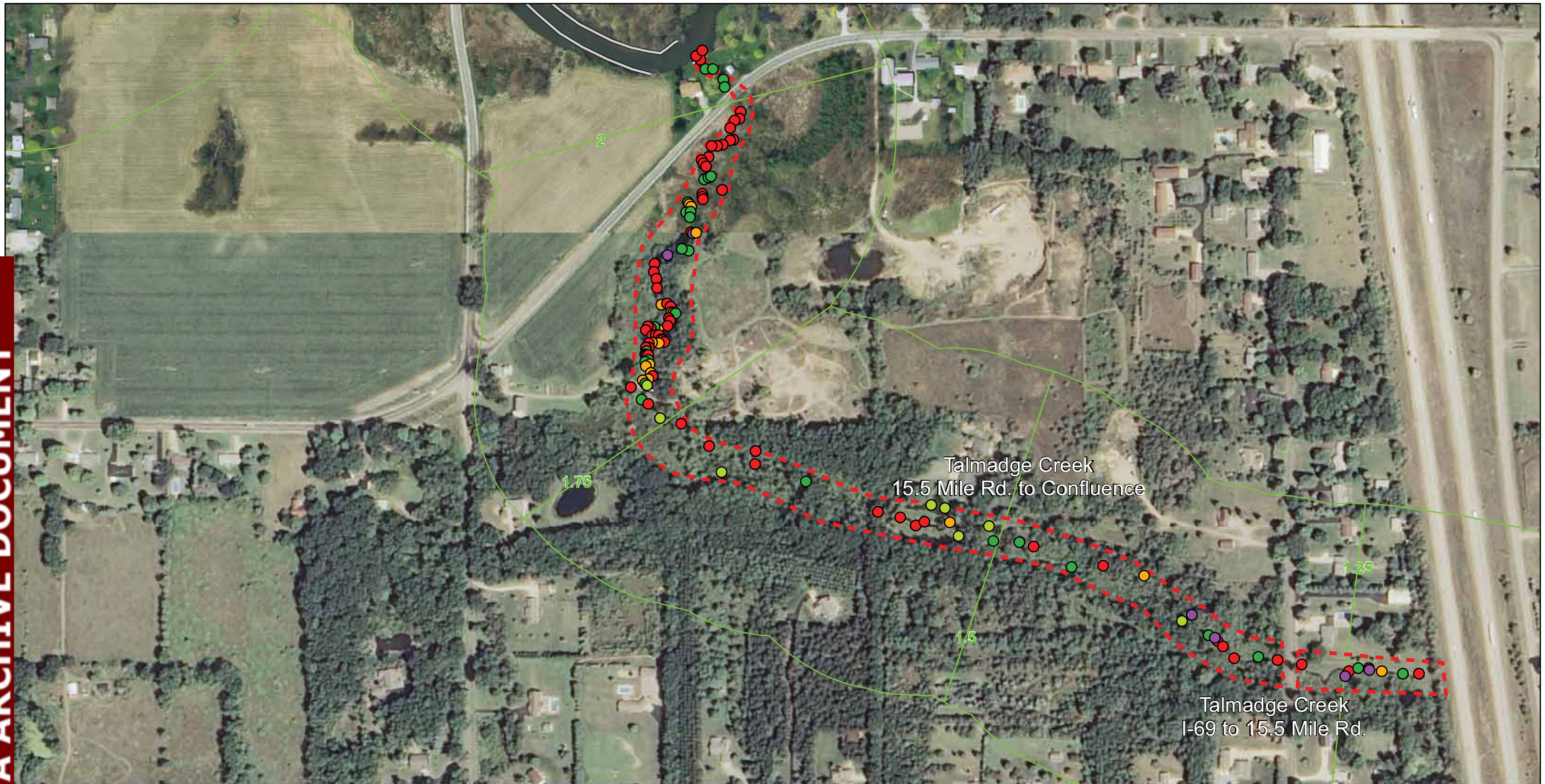
[Signature]

10/7/2010

SITE SUMMARY – TALMADGE CREEK

The information provided below shall be used by the field teams to better understand site specific characteristics of the priority locations and determine the most appropriate recovery technology.

Site Location:	Talmadge Creek
Site Layout:	See Figure Attached
Description and Geomorphic Setting:	Narrow creek with meandering channel
Approximate Areal Extent:	2 river miles
Approximate Depth of Water:	0.0-0.5 feet
Sediment thickness:	0-1 foot
Bed type:	Soft sediment, sand, and gravel
Data Collected:	
Poling (Y/N)	Y
Cores (Y/N)	Y
Lab analysis (Y/N)	Y
Community Description and Habitat Quality:	Refer to Technical Memorandum – Final dated September 23, 2010 to U.S. EPA OSC from Weston Solutions, Inc. START
Containment:	A number of various containment structures and systems
Access Issues:	Not accessible via boat
Miscellaneous:	N/A
Recommendations:	ECO: Per Wetland Assessment Report dated August 2010 by URS Corporation, approximately 2.84 acres of Wetland A will be impacted by excavation activities. This wetland was an emergent and forested wetland associated with Talmadge Creek. SOTF: Extensive restoration already undertaken, including excavation and off-site disposal. Recommend that reasonably aggressive steps be taken to remove the submerged oil. The technique employed would rely primarily on aeration, but may also include sediment skimming, flushing, raking or a combination of these.



0 300 600
1 inch = 300 feet

Legend

Pre Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy
- Observed But Quantity Not Noted

Priority Areas

Submerged Oil Delineation Area

Priority Area Approximate Containment (if known)

Division Quarter Mile Grid

Poling Data Collected Through:
September 19, 2010

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

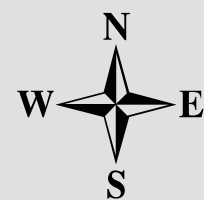
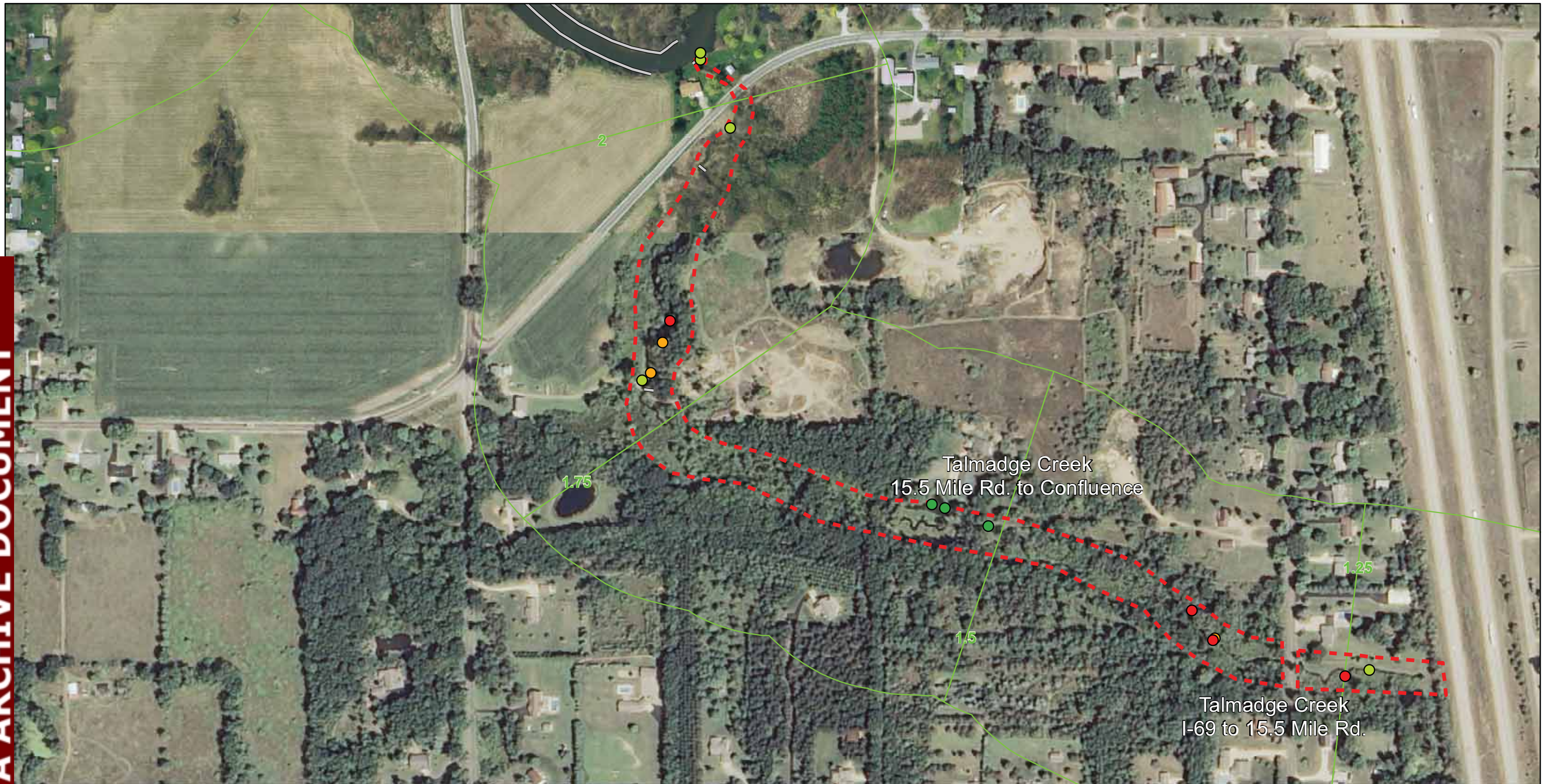
PRIORITY AREA PRE RECOVERY QUALITATIVE RESULTS

Talmadge Creek I-69 to 15.5 Mile Rd.
and 15.5 Mile Rd. to Confluence

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 25, 2010





0 300 600

1 inch = 300 feet

Legend

Post Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

Poling Data Collected Through:
October 17, 2010

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

PRIORITY AREA POST RECOVERY QUALITATIVE RESULTS

Talmadge Creek I-69 to 15.5 Mile Rd.
and 15.5 Mile Rd. to Confluence

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 26, 2010



TETRA TECH EC, INC.

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 9-22-2010

EPA(REP): John Verlac

ENBRIDGE(REP): Mike Smiley

LOCATION
(Division/Sect/MP)

Talmadge Creek
15 1/2 Mile Road to confluence

CLEANUP METHODS USED

Method: Raking Notes: 12 man crew raked creek to stir up the trapped oil

Method: _____ Notes: _____

Method: _____ Notes: _____

OIL COLLECTION METHODS USED

Method: **Sorbent Boom**—collected light sheen as it appeared and started to move downstream

Method: **Vacuum Truck**—collected the heavier contaminants at collection points.

DISCERNABLE OIL
OBSERVED (end of day)

Very light sheen

Sheen(heavy, medium, light) Very light—in spots Globules no

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): yes

Team Lead: Mike Smiley

Notes: After completion of raking operations, only a very light sheen was observed in

Spots along the creek. The boom maintenance crews station along the creek –to handle this.

Remediation Complete
SITE APPROVAL

Name

Signature

Date

EPA:

JOSE NEBAM

Enbridge:

Scott Swirech

10/1/2010

10/7/2010

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 10/22/10

EPA(REP):

ENBRIDGE(REP): John Sonnenberg SET

LOCATION
(Division/Sect/MP)

**Talmadge Creek
Confluence (into the Kalamazoo)**

CLEANUP METHODS USED

Method: Water flushing Notes: Flushed the two cells, three times each

Method: _____ Notes: _____

Method: _____ Notes: _____

OIL COLLECTION METHODS USED

Method: sorbent boom-collected floating oil/sheen as it appeared, sorbent pads

Method: _____

DISCERNABLE OIL
OBSERVED (end of day) no

Sheen(heavy, medium, **light**) no no globules of oil

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): YES

Team Lead: John Sonnenberg

Remediation Complete
SITE APPROVAL

Name

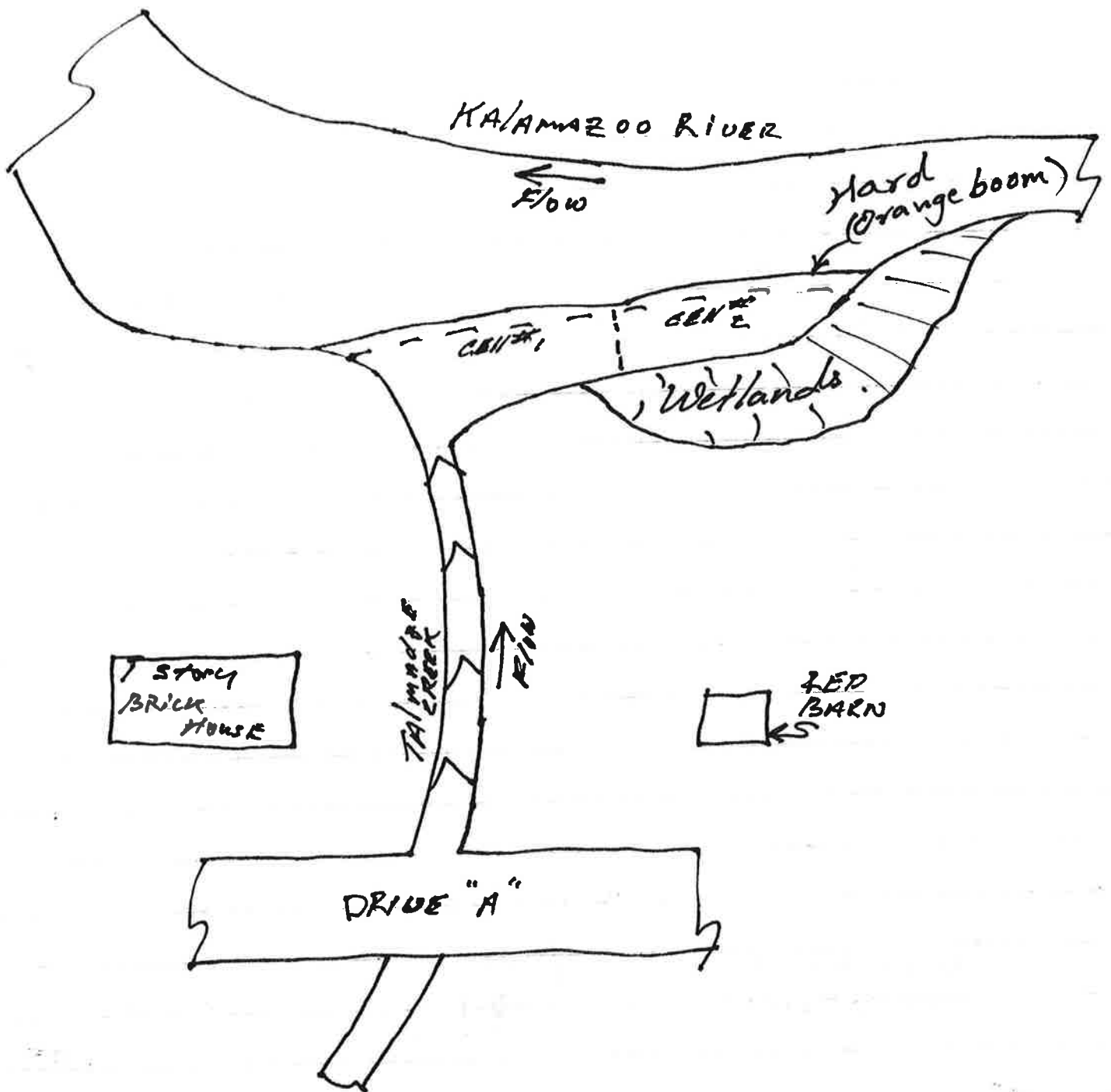
Signature

Date

EPA: PAUL R. BENONARD

Enbridge: Scott Swick

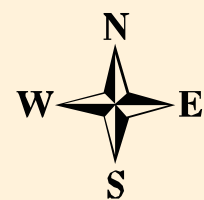
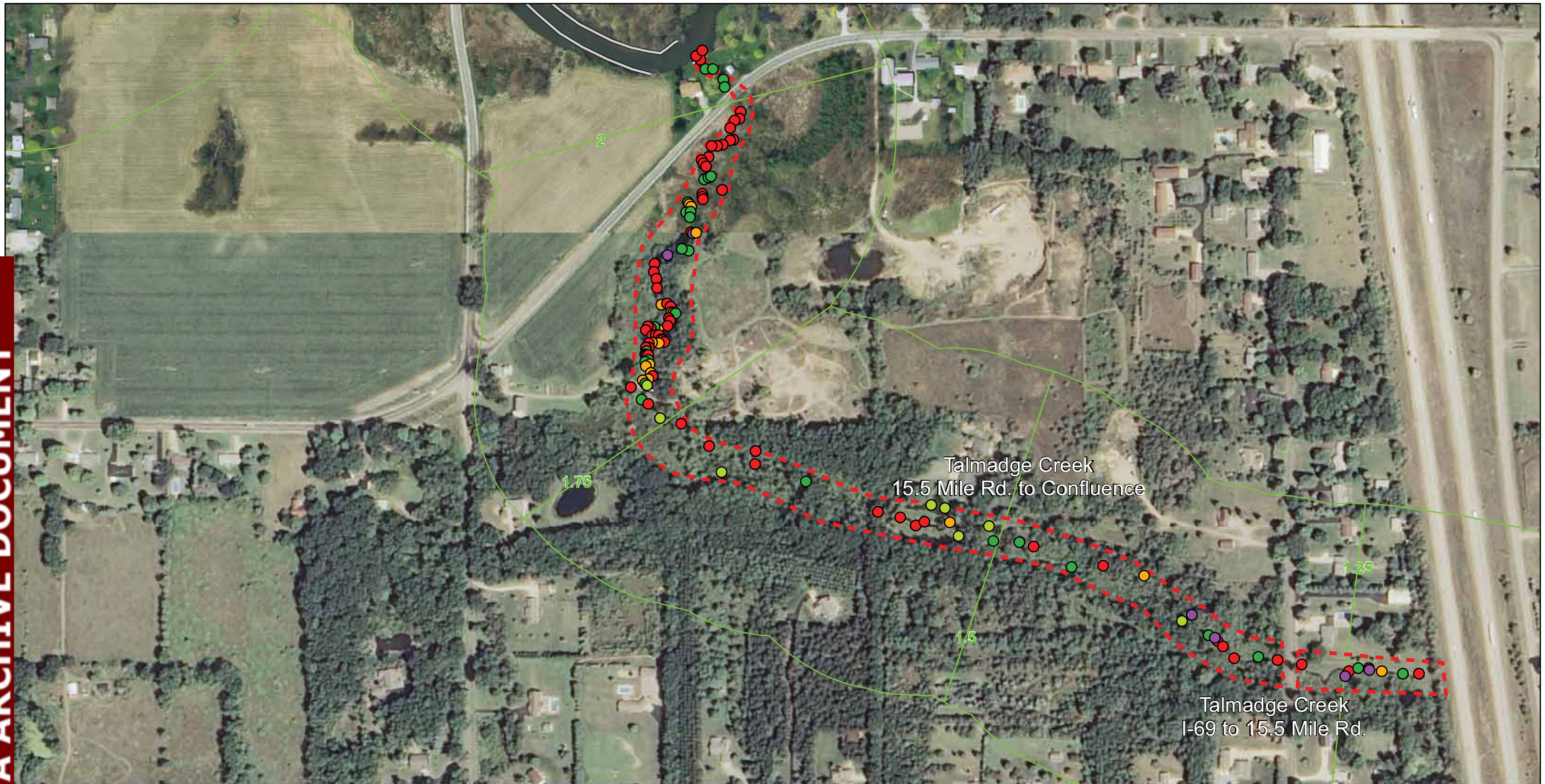
10/23/2010
10/23/2010



SITE SUMMARY – TALMADGE CREEK

The information provided below shall be used by the field teams to better understand site specific characteristics of the priority locations and determine the most appropriate recovery technology.

Site Location:	Talmadge Creek
Site Layout:	See Figure Attached
Description and Geomorphic Setting:	Narrow creek with meandering channel
Approximate Areal Extent:	2 river miles
Approximate Depth of Water:	0.0-0.5 feet
Sediment thickness:	0-1 foot
Bed type:	Soft sediment, sand, and gravel
Data Collected:	
Poling (Y/N)	Y
Cores (Y/N)	Y
Lab analysis (Y/N)	Y
Community Description and Habitat Quality:	Refer to Technical Memorandum – Final dated September 23, 2010 to U.S. EPA OSC from Weston Solutions, Inc. START
Containment:	A number of various containment structures and systems
Access Issues:	Not accessible via boat
Miscellaneous:	N/A
Recommendations:	ECO: Per Wetland Assessment Report dated August 2010 by URS Corporation, approximately 2.84 acres of Wetland A will be impacted by excavation activities. This wetland was an emergent and forested wetland associated with Talmadge Creek. SOTF: Extensive restoration already undertaken, including excavation and off-site disposal. Recommend that reasonably aggressive steps be taken to remove the submerged oil. The technique employed would rely primarily on aeration, but may also include sediment skimming, flushing, raking or a combination of these.



0 300 600
1 inch = 300 feet

Legend

Pre Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy
- Observed But Quantity Not Noted

Priority Areas

Submerged Oil Delineation Area

Priority Area Approximate Containment (if known)

Division Quarter Mile Grid

**Poling Data Collected Through:
September 19, 2010**

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

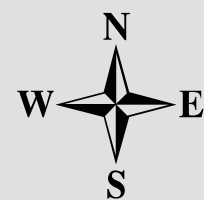
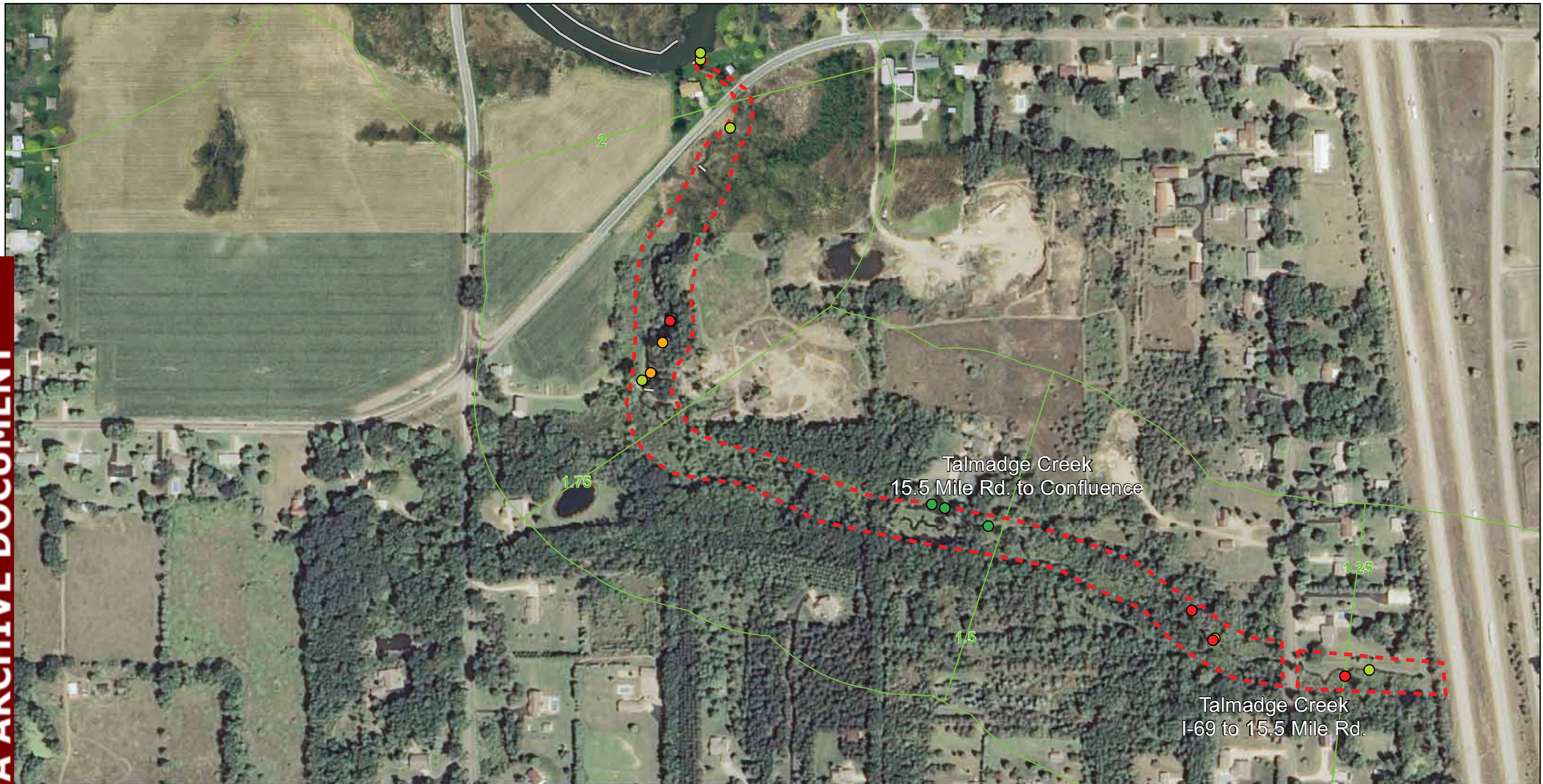
**PRIORITY AREA PRE RECOVERY
QUALITATIVE RESULTS**

**Talmadge Creek I-69 to 15.5 Mile Rd.
and 15.5 Mile Rd. to Confluence**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 25, 2010





0 300 600

1 inch = 300 feet

Legend

Post Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

Poling Data Collected Through:
October 17, 2010

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

PRIORITY AREA POST RECOVERY QUALITATIVE RESULTS

Talmadge Creek I-69 to 15.5 Mile Rd.
and 15.5 Mile Rd. to Confluence

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 26, 2010



TETRA TECH EC, INC.



TETRA TECH EC, INC.

PHOTOGRAPH LOG
Photograph 1**Project Name:**
Enbridge Line 6B
Submerged Oil Task Force**Mile Post:**
Talmadge Creek – Source
Area to I-69**Date:**
9/25/10**Description:**
Recovery activities in
progress**View Direction:**
Facing north

TETRA TECH EC, INC.

PHOTOGRAPH LOG
Photograph 2**Project Name:**
Enbridge Line 6B
Submerged Oil Task Force**Mile Post:**
Talmadge Creek – Source
Area to I-69**Date:**
10/17/10**Description:**
Post Recovery – Recovery
complete**View Direction:**
Facing north



TETRA TECH EC, INC.

PHOTOGRAPH LOG
Photograph 3**Project Name:**Enbridge Line 6B
Submerged Oil Task Force**Mile Post:**Talmadge Creek –
Confluence**Date:**

10/22/10

Description:Recovery activities in
progress**View Direction:**

Facing south



TETRA TECH EC, INC.

PHOTOGRAPH LOG
Photograph 4**Project Name:**Enbridge Line 6B
Submerged Oil Task Force**Mile Post:**Talmadge Creek –
Confluence**Date:**

10/22/10

Description:Recovery activities in
progress**View Direction:**

Facing south



**Enbridge Line 6B MP 608 Pipeline Release
Marshall, Michigan**

**Permanent Recovery of Submerged Oil and Oil-Contaminated
Sediments at Priority Locations**

**Submerged Oil Recovery Summary Report
Kalamazoo River MP 5.55 North (Upstream of Ceresco Dam)**

Enbridge Energy

EXECUTIVE SUMMARY

A Submerged Oil Task Force (SOTF) was created on Tuesday, August 24, 2010, to perform field assessment, characterization, and mapping of submerged oil impacts in surface water and sediments of Talmadge Creek, Kalamazoo River and Morrow Lake (Talmadge Creek to Kalamazoo River to River Mile Post [RMP] 40). The SOTF is comprised of representatives from the United States Environmental Protection Agency (USEPA), the Michigan Department of Natural Resources and the Environment (MDNRE), Stakeholders, Enbridge and their contractors.

As a result of the initial field assessments, 34 sites in the Kalamazoo River had been identified as potentially containing accumulations of significant amounts of submerged oil in river sediments. These areas were further investigated, and 18 were identified as high priority areas and were recommended for submerged oil recovery by the SOTF. These 18 priority areas were also subjected to an ecological habitat assessment intended to classify their ecological use and value to help guide cleanup operations. The SOTF discussed the assessment in conjunction with possible cleanup approaches, and in a September 21, 2010 memorandum the Task Force Leaders provided recommendations for oil removal for these 18 priority areas.

Initial Assessment

The Qualitative Assessment was a reconnaissance effort to quickly identify areas with the presence of submerged oil, identify depositional areas, prioritize sites based on a relative comparison of impacted sites, and obtain information on the depositional/erosional characteristics of geomorphic settings in which the impacted sites were identified. This was accomplished by an initial visual assessment followed by in-channel sediment poling, which consisted of inserting a graduated metal pole equipped with a foot disk, into the sediment and recording visual evidence of oil, sheen (light, moderate, or heavy), droplets, globules, and/or tar balls after the sediment was agitated. Each poling location was located by GPS, with the elevation of the water surface, depth of water, top of sediment, and depth of soft sediment recorded. Both the visual assessment and the poling results were documented in field logs. The qualitative poling results of RMP 5.55 North were not indicative of the visual field observations made that warranted this site to be designated as a priority site. The primary criterion for prioritizing sites for quantitative sampling was the visual presence of oil in the qualitative phase. These areas were identified by the Tetra Tech field scientists. Depositional areas of the river were mapped and targeted for sampling during the quantitative sampling program.

RMP 5.55 North - (Upstream of Ceresco Dam)

MP 5.55 North is a shallow cove on right bank, looking downstream, approximately 1,400 feet upstream of Ceresco Dam. The approximate areal extent of this priority location is 1.5 acres and the depth to water is 0 to 1 foot near shore, graduating to deeper water near the former silt curtain. The soft sediment thickness in this area is greater than 2 feet.

Actions

MP 5.55 North was divided into 20 cells for oil recovery purposes (please refer to the sign-off sheet in the attachments for a sketch of the cell layout). Oil recovery activities ran from September 29, 2010, through October 3, 2010. The cells were aerated with combination of the pond aerators (4 aerators were used by 4 separate teams) with two passes conducted in each cell on September 29, 2010, plus a third pass in cells 4, 5, 6, 7, 8, 9, and 12 with moderate to

heavy sheen reported. One cell, number 20, was deemed too deep for the pond aerators; therefore this cell was flushed with water using an extended PVC (1.25-inches diameter) wand coupled to a pump, which operated at the top of the sediment. On September 30, 2010, additional passes with the aerators occurred in cells 7, 8, 9, 16, and 17. On October 1, 2010, in cells 16, 17, and 18 additional hour long passes were performed with a pond aerator. Oil was collected by sweeping each cell with leaf blowers and picking up the oil with absorbent boom and pads. On October 3, 2010, priority site MP 5.55 North was recommended for final sign-off.

Outcome

The site was visited by USEPA and Enbridge representatives on October 7, 2010, at 4:30 PM. The USEPA and Enbridge representatives entered the site via airboat and reportedly disturbed sediment throughout the cells; no tar balls or sheen was noted on their sign-off documentation. Site MP 5.55 North was cleared and received final sign-off.

Post recovery qualitative poling identified moderate to heavy oil after the inspection. The cove created by a sandbar that exists at this location creates a natural accumulation point of oil released from upstream areas. This site will enter the Operation and Maintenance Program for monitoring.

Attachment Descriptions

The ensuing information listed below directly follows in this Submerged Oil Recovery Summary Report:

- USEPA and Enbridge signed Submerged Oil Remediation Status Tracking Form.
 - Contains signatory approvals.
- Site Summary
 - Provides information used by the field teams to better understand site specific characteristics of the priority locations and determined the most appropriate recovery technology. Information included site layout, areal extent, depth to water, sediment thickness, sediment bed type, data collected, habitat description and habitat quality, containment measures, access, and recommendations.
- Pre- and Post- Submerged Oil Recovery Figures
 - Presents qualitative pre- and post- poling data in a graphical format.
- Photographs
 - Provides visual documentation of pre- and post- submerge oil recovery activities.

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 10-3-10

EPA(REP): Karen Berez

ENBRIDGE(REP): John Maffeo/Mike Blevin

LOCATION
(Division/Sect/MP)

MP 5.55

CLEANUP METHODS USED

Method: Aeration Notes: Aerated cells 1-19

Method: Water flush Notes: On cell 20 (too deep to aerate)

Method: _____ Notes: _____

OIL COLLECTION METHODS USED

Method: sorbent boom

Method: sorbent pads

DISCERNABLE OIL
OBSERVED (end of day)

NO

Sheen(heavy, medium, light)

No

Globules

No

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): YES

Team Lead: Mike Blevin

Comments:

Remediation Complete
SITE APPROVAL

Name

Signature

Date

EPA:

Enbridge:

[Signature]
Scott Seich

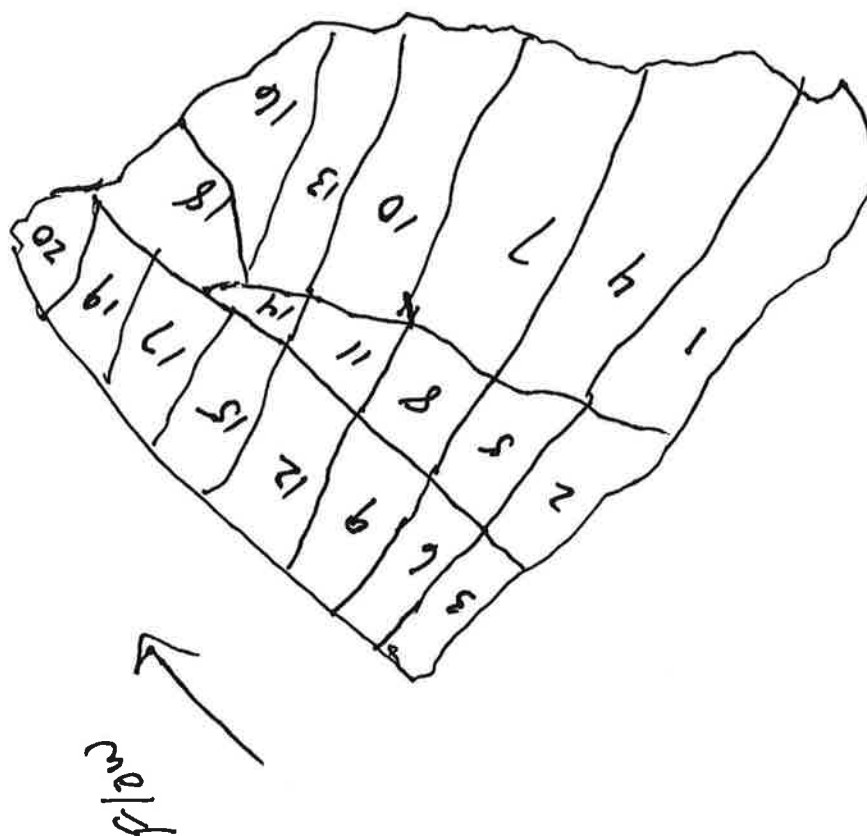
[Signature]
#0490
Scott Seich

10/7/10
10/2/2010

MP 5.55

10/1/10 @ U³⁰

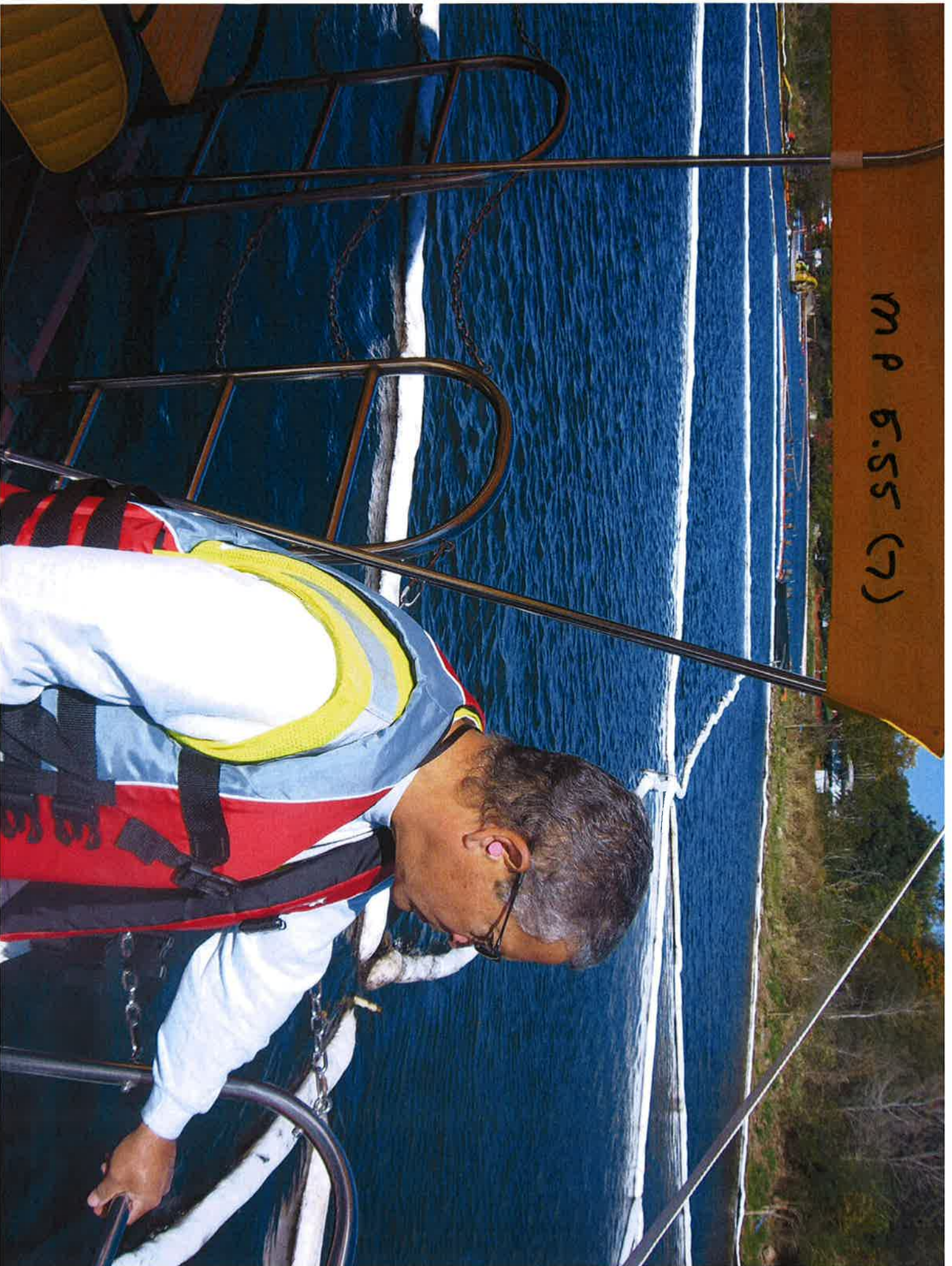
entered site w/ airboat &
disturbed sediment throughout
no fanballs or shien observed
Clear





MP 5.55(8)

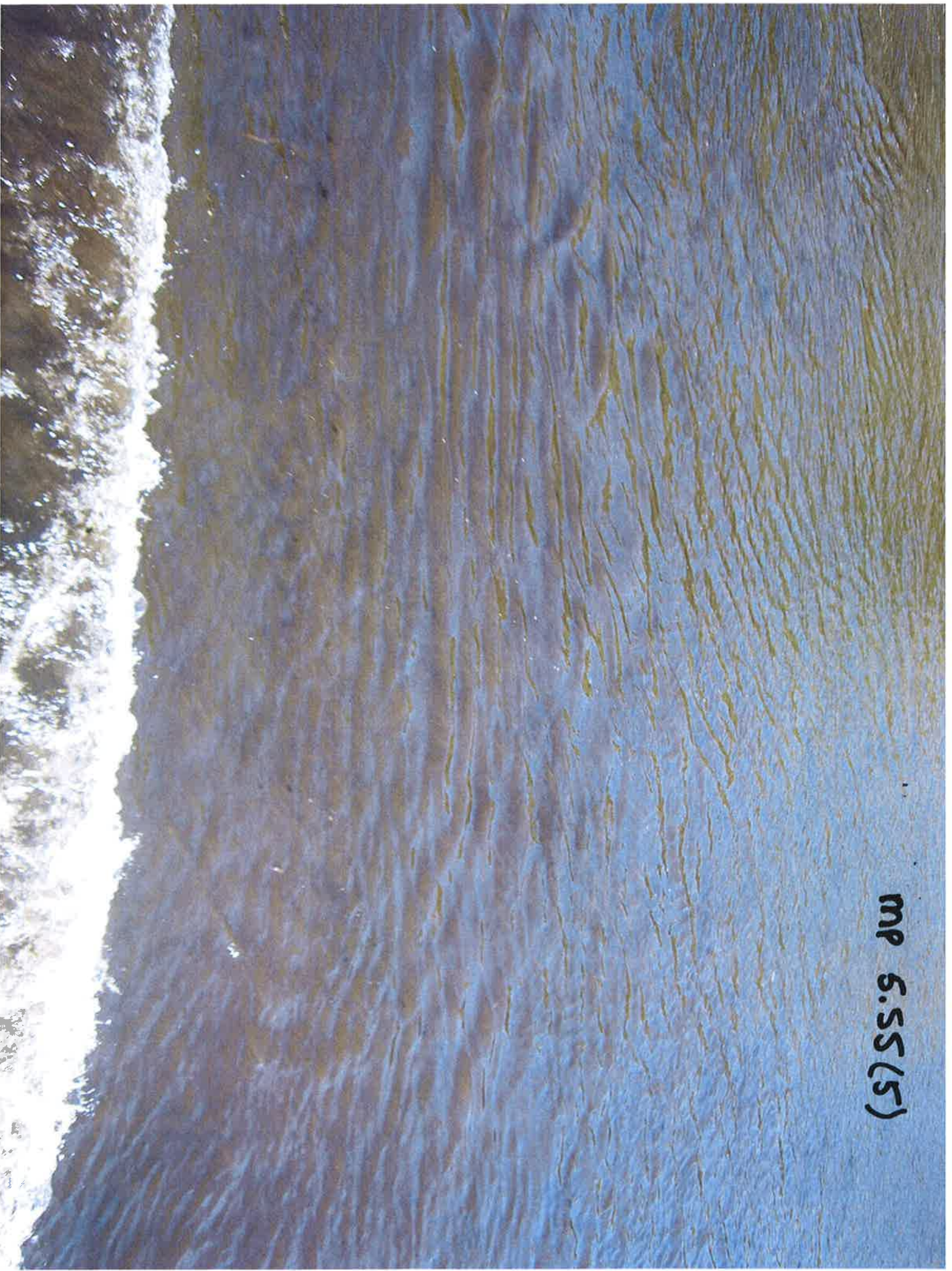
MP 6.55 (7)



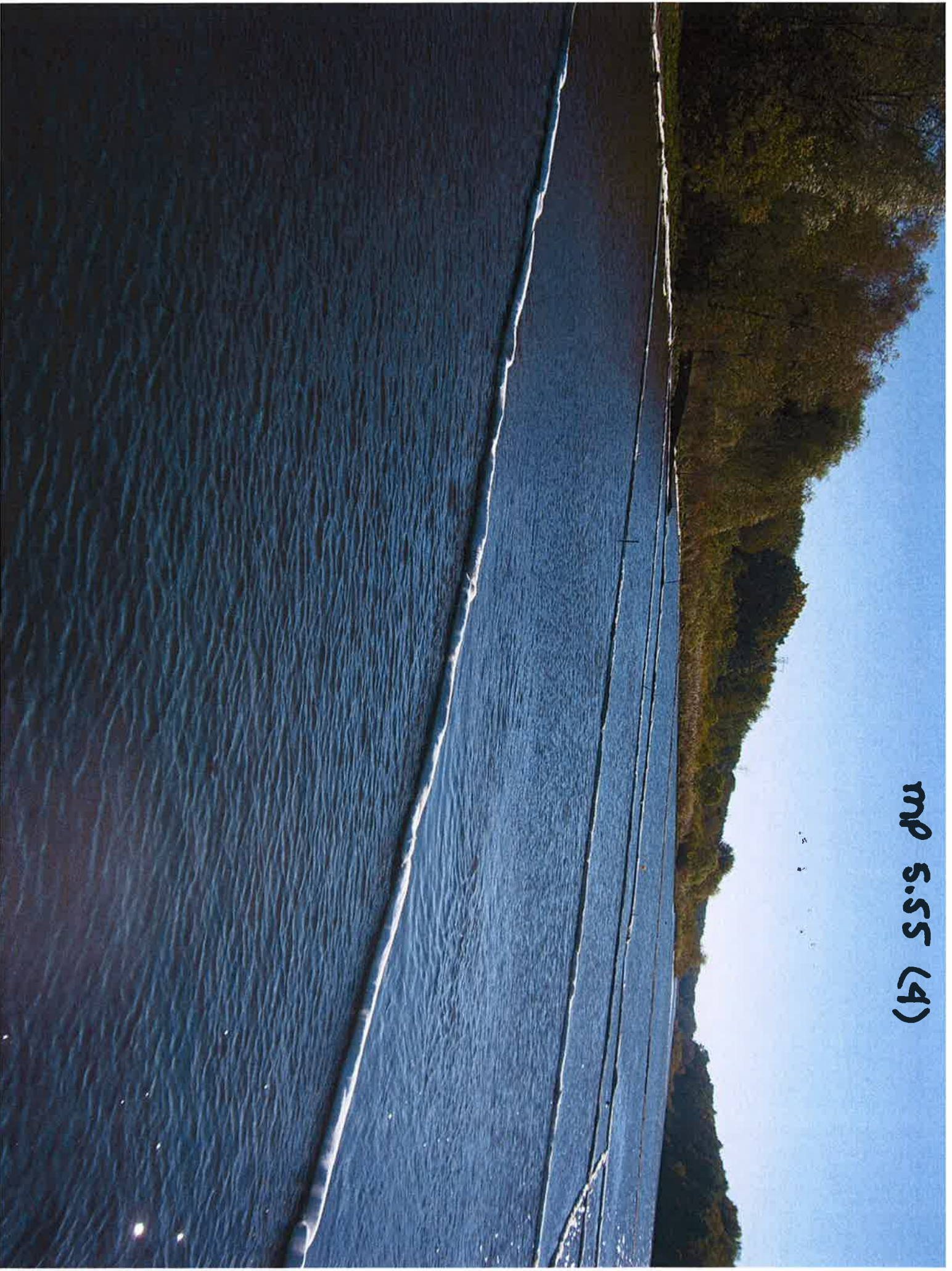
mp 5.55 (6)



mp 5.55(5)



mp 5.55 (4)



mp 5.55 (3)

mp 5.55 (2)



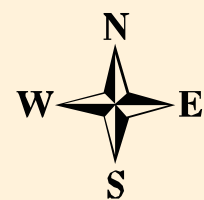
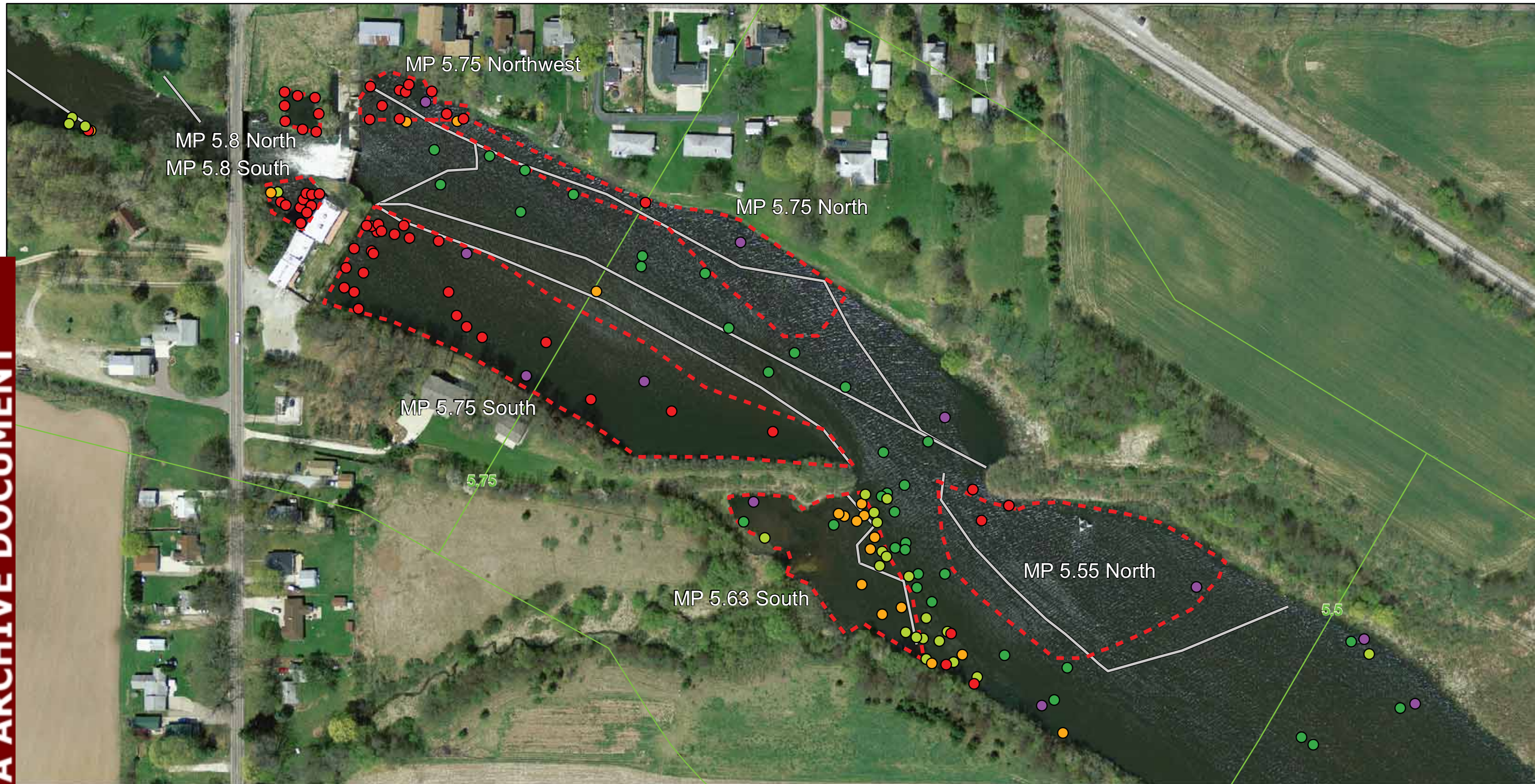
MP 5.55 (1)



SITE SUMMARY – MP 5.55 NORTH

The information provided below shall be used by the field teams to better understand site specific characteristics of the priority locations and determine the most appropriate recovery technology.

Site Location:	MP 5.55 North
Site Layout:	See Figure Attached
Description and Geomorphic Setting:	Shallow cove on right bank looking downstream, upstream of Ceresco Dam
Approximate Areal Extent:	~1.5 acres
Approximate Depth of Water:	0 to 1 foot near shore, deeper towards silt curtain
Sediment thickness:	2+ feet
Bed type:	Soft sediment
Data Collected:	
Poling (Y/N)	Y
Cores (Y/N)	Y
Lab analysis (Y/N)	Y
Community Description and Habitat Quality:	High quality habitat has been impacted. Aquatic beds dominated by <i>Peltandra</i> and <i>Nymphaea</i> have been cut. Potential fish spawning habitat for grass pickerel, Northern pike and other grass spawners. Turtle habitat and green frog observed. Also habitat for wading birds, shorebirds, rails, waterfowl and muskrat.
Containment:	Silt curtains; details not known
Access Issues:	None
Miscellaneous:	N/A
Recommendations:	ECO: Area has already been impacted by clearing of vegetation. Area may be dredged to address remaining oil, but mitigation will be required by MDNRE as high quality habitat has been impacted. SOTF: Combination of aeration and shoreline dredging



0 150 300
1 inch = 150 feet

Legend

Pre Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy
- Observed But Quantity Not Noted



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

Poling Data Collected Through:
October 18, 2010

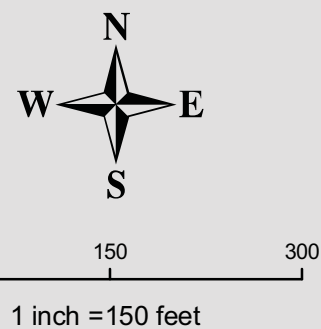
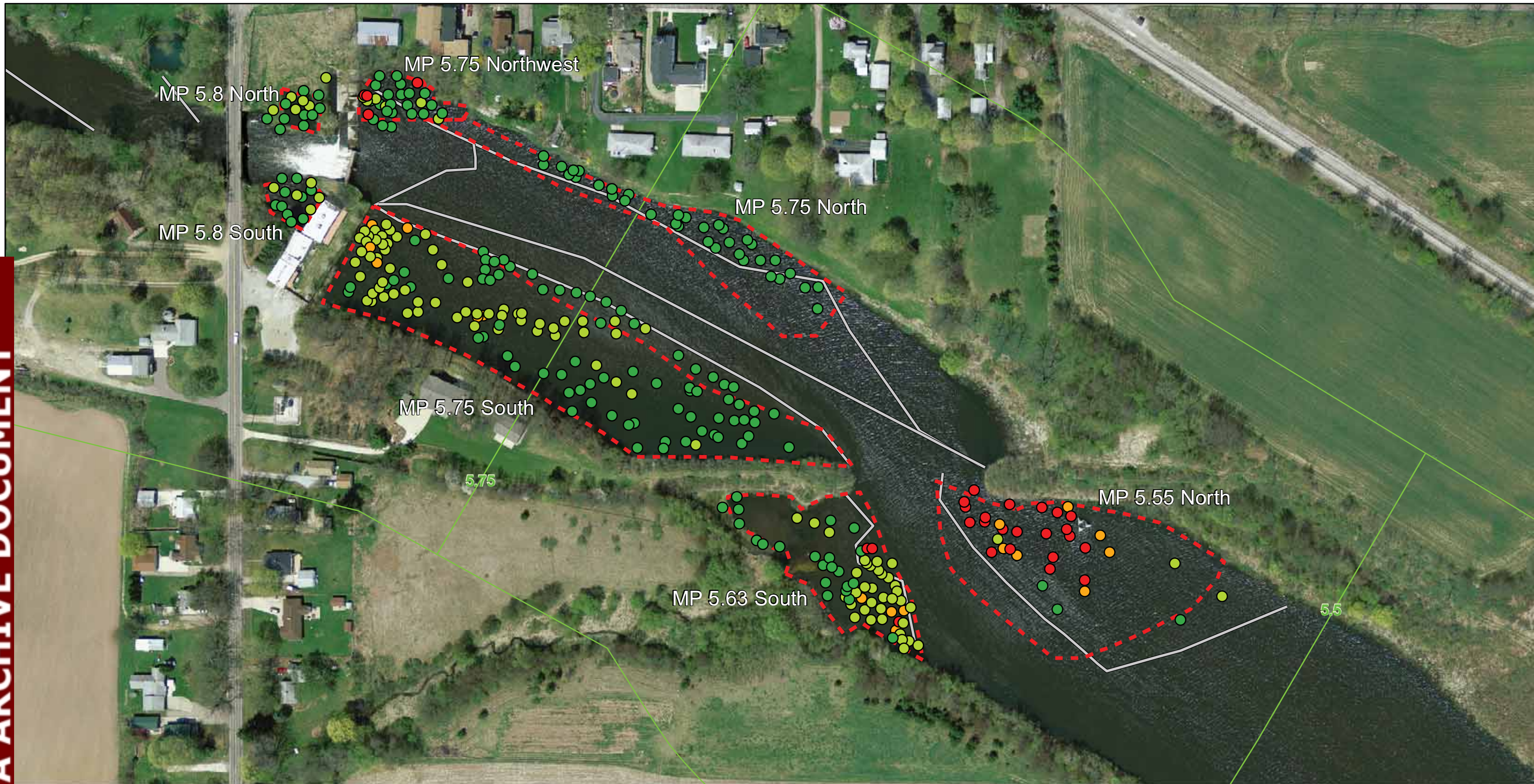
Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA PRE RECOVERY
QUALITATIVE RESULTS**
**MP 5.55 N, MP 5.63 S, MP 5.75 N, MP 5.75 S,
MP 5.75 NW, MP 5.8 N, and MP 5.8 S**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 25, 2010





Legend

Post Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

**Poling Data Collected Through:
October 24, 2010**

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA POST RECOVERY
QUALITATIVE RESULTS**
MP 5.55 N, MP 5.63 S, MP 5.75 N, MP 5.75 S,
MP 5.75 NW, MP 5.8 N, and MP 5.8 S

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 26, 2010



PHOTOGRAPH LOG

Photograph 1

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.55 North

Date:
10/03/10

Description:
Recovery activities in
progress – aeration

View Direction:
Facing north



PHOTOGRAPH LOG

Photograph 2

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.55 North

Date:
10/03/10

Description:
Recovery activities in
progress - aeration

View Direction:
Facing north



PHOTOGRAPH LOG
Photograph 3

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.55 North

Date:
10/29/10

Description:
Post Recovery activities –
removing boom and other
containment

View Direction:
Facing north

**PHOTOGRAPH LOG**
Photograph 4

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.55 North

Date:
10/29/10

Description:
Post recovery activities –
removing boom and other
containment

View Direction:
Facing north



**Enbridge Line 6B MP 608 Pipeline Release
Marshall, Michigan**

**Permanent Recovery of Submerged Oil and Oil-Contaminated
Sediments at Priority Locations**

**Submerged Oil Recovery Summary Report
Kalamazoo River MP 5.63 South
(Cove Upstream of Ceresco Dam)**

Enbridge Energy

EXECUTIVE SUMMARY

A Submerged Oil Task Force (SOTF) was created on Tuesday, August 24, 2010, to perform field assessment, characterization, and mapping of submerged oil impacts in surface water and sediments of Talmadge Creek, Kalamazoo River and Morrow Lake (Talmadge Creek to Kalamazoo River to River Mile Post [RMP] 40). The SOTF is comprised of representatives from the United States Environmental Protection Agency (USEPA), the Michigan Department of Natural Resources and the Environment (MDNRE), Stakeholders, Enbridge and their contractors.

As a result of the initial field assessments, 34 sites in the Kalamazoo River had been identified as potentially containing accumulations of significant amounts of submerged oil in river sediments. These areas were further investigated, and 18 were identified as high priority areas and were recommended for submerged oil recovery by the SOTF. These 18 priority areas were also subjected to an ecological habitat assessment intended to classify their ecological use and value to help guide cleanup operations. The SOTF discussed the assessment in conjunction with possible cleanup approaches, and in a September 21, 2010 memorandum the Task Force Leaders provided recommendations for oil removal for these 18 priority areas.

Initial Assessment

The Qualitative Assessment was a reconnaissance effort to identify areas with the presence of submerged oil, identify depositional areas, prioritize sites based on a relative comparison of impacted sites, and obtain information on the depositional and erosional characteristics of geomorphic settings in which the impacted sites were identified. This was accomplished by in-channel sediment poling, which consisted of inserting a graduated metal pole equipped with a foot disk, into the sediment and recording visual evidence of oil, sheen (light, moderate, or heavy), droplets, globules, and/or tar balls after the sediment was agitated. Each poling location was located by GPS, with the elevation of the water surface, depth of water, top of sediment, and depth of soft sediment recorded. The primary criterion for prioritizing sites for quantitative sampling was the visual presence of oil in the qualitative phase. These areas were identified by the Tetra Tech field scientists. Depositional areas of the river were mapped and targeted for sampling during the quantitative sampling program.

RMP 5.63 South - (Cove Upstream of Ceresco Dam)

MP 5.63 South is a shallow cove on left bank, looking downstream, approximately 900 feet upstream of Ceresco Dam. The approximate areal extent of this priority location is 1 acre and the depth to water is 0 to 0.5 foot near shore, graduating to deeper water near the hard boom. The soft sediment thickness in this area is greater than 2 feet.

The SOTF determined that Amphibex dredge technology would be used for dredging at the Ceresco Dam Priority Locations MP 5.63 South, MP 5.75 South, and MP 5.75 Northwest (Cells 8, 9, and 10). The use of an Amphibex dredge excavator did not require an increase in the Kalamazoo River water elevation to float the equipment, as typically would be required for conventional dredging equipment.

The dredged sediment was pumped into Geotubes for dewatering with the use of polymers to enhance settling of suspended solids. Within the dewatering and treatment area, weep water was captured in a lined sump, which in turn was pumped into a water treatment system prior to discharge into the Kalamazoo River in accordance with a MDNRE NPDES Permit.

Actions

Submerged oil recovery activities by dredging occurred from September 29th 2010, through October 24, 2010. Priority areas 5.63 South, 5.75 South, and the 5.75 NW were hydraulically dredged. Operations were conducted primarily during the daylight hours of 0800 to 2100. Nighttime operations were considered, but not implemented due to the close proximity of the residential locations. Approximately 6,800 cubic yards of sediment and an undetermined volume of recoverable oil were collected in 9 Geotubes and the water treatment system. The range of depth of sediment removed was from 1.5 to 2 feet. Generally, depth of removal increased as the cut approached the face of the dam. The project was delivered ahead of schedule and without health and safety incident.

From an environmental function, project management executed the collection and analysis of the following sets of performance management data:

1. Effluent samples at a frequency above and beyond the requirements of the NPDES permit were collected throughout the process.
2. Continuous on site and perimeter real time air monitoring, air samples, and noise readings during the periods of operation
3. Daily surface water quality analyte samples and
4. Continuous surface water quality real time measurements for such parameters as turbidity, pH and temperature.

The environmental data manager effectively managed and delivered this data from multiple sources in a timely manner for onsite project management. These sets of data were used to demonstrate best management practices during the course of the dredging activity. Please refer to the site workplan for more details concerning these data sets. The following documents the overall findings of these data sets:

1. All NPDES requirements were met during the period of operation.
2. Real time air monitoring before and during the 25 days of Ceresco dredging operations documented 2 benzene detects out of approximately 2,240 readings and 16 volatile organic compound (VOC) detection out of approximately 5,770 readings. The maximum concentration was 1 part per million (ppm) for benzene and 0.9 ppm for VOCs, respectively. The overwhelming majority of analytical samples showed no crude oil-related analytes of interest were detected. These air monitoring and sample results confirm that air quality was not adversely impacted by dredging activities. Odor complaints due to dredging operations were not reported.
3. Noise monitoring was conducted daily within the Ceresco community as well as the work area. Complaints of excessive noise due to dredging operations were not reported.

4. Surface water samples were collected daily from the following three locations, upstream of dredging operations, downstream of operations but upstream of the dam, and downstream of the dam just west of the final containment measures. VOCs and semi-VOCs concentrations were less than reporting detection limit for the samples collected. Concerning metals, relatively minor concentrations of iron, lead, zinc, and manganese were detected sporadically during the sampling program at all 3 locations. The results demonstrate that surface water quality was not adversely impacted by dredging operations.
5. Continuous measurements of turbidity, pH, dissolved oxygen, specific conductivity, and temperature collected by Eureka Environmental Manta 2 Multiprobes at downstream and upstream locations of dredging operations. Turbidity measurements were successfully used as part of the best management practices to ensure that dredging operations did not create sustained periods of downstream turbidity greater than two times upstream. Containment boom and turbidity curtains placement and maintenance successfully contained sheen and turbidity within the dredging area.

From an operational perspective, the following actions constituted the significant elements which led to the success of the project:

1. The framework of the workplan allowed for ample design, detail and flexibility to provide for an organized and effective construction of the main execution components of treatment pad, treatment system, hydraulic dredge sediment removal, sediment and oil containment measures and geobag management. The flexibility and delegation to field decision makers allowed for rapid and effective response to changing site conditions.
2. The construction manager effectively coordinated in an anticipatory mode with several layers of management to execute construction components such as drainage pad construction, water treatment system installation and multiple dredge use ahead of construction schedule.
3. Excellence in trades and health & safety operations was maintained thru rigorous multiple layer coordination, onsite safety officer excellence and the awareness of onsite workers.
4. Innovative solutions were executed to overcome obstacles:
 - a. Debris location in the dredge zones ahead of dredger using techniques such as pre-poling and metals detecting instrumentation.
 - b. Innovative use of multiple sediment curtain layers of varying types and uses such as carbon impregnated layered material and attaching boom to the moving dredge in a containment pattern
 - c. Maintaining rapid access and deployment for critical dredge components that allowed for efficient repairs typical of dredge projects with significantly reduced down time.
 - d. Use and efficient execution of the shallow water, high solids Amphibex dredger
 - e. Rapid mobilization of 2 additional dredges and successful simultaneous execution of 3 dredgers which was necessary to meet the expanded scope and

provide overall project savings by reducing the original schedule timeline by approximately a week.

Outcome

The site was visited by USEPA and Enbridge representatives on October 24, 2010. Site MP 5.63 South was cleared and received final sign-off.

Attachment Descriptions

The ensuing information listed below directly follows in this Submerged Oil Recovery Summary Report:

- USEPA and Enbridge signed Submerged Oil Remediation Status Tracking Form.
 - Contains signatory approvals.
- Site Summary
 - Provides information used by the field teams to better understand site specific characteristics of the priority locations and determined the most appropriate recovery technology. Information included site layout, areal extent, depth to water, sediment thickness, sediment bed type, data collected, habitat description and habitat quality, containment measures, access, and recommendations.
- Pre- and Post- Submerged Oil Recovery Figures
 - Presents qualitative pre- and post- poling data in a graphical format.
- Photographs
 - Provides visual documentation of pre- and post- submerge oil recovery activities.

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 10-23-2010

EPA(REP): John Verlac

ENBRIDGE(REP): Mike Smiley /Robert Suehs Dan Sullivan TetraTech (dredging)

LOCATION
(Division/Sect/MP) **MP 5.63 Ceresco Dam**

site recommended for dredging prior to starting aeration treatment

CLEANUP METHODS USED

Method: Dredging Notes: Site fully dredged

Method: _____ Notes: _____

Method: _____ Notes: _____

OIL COLLECTION METHODS USED

Method: sorbent boom

Method: _____

DISCERNABLE OIL
OBSERVED (end of day) No, site fully dredged

Sheen(heavy, medium, light) no

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): **Yes**

Team Lead: Dan Sullivan

Remediation Complete
SITE APPROVAL

Name

Signature

Date

EPA:

Leo Frank

Leo Frank

10/24/10

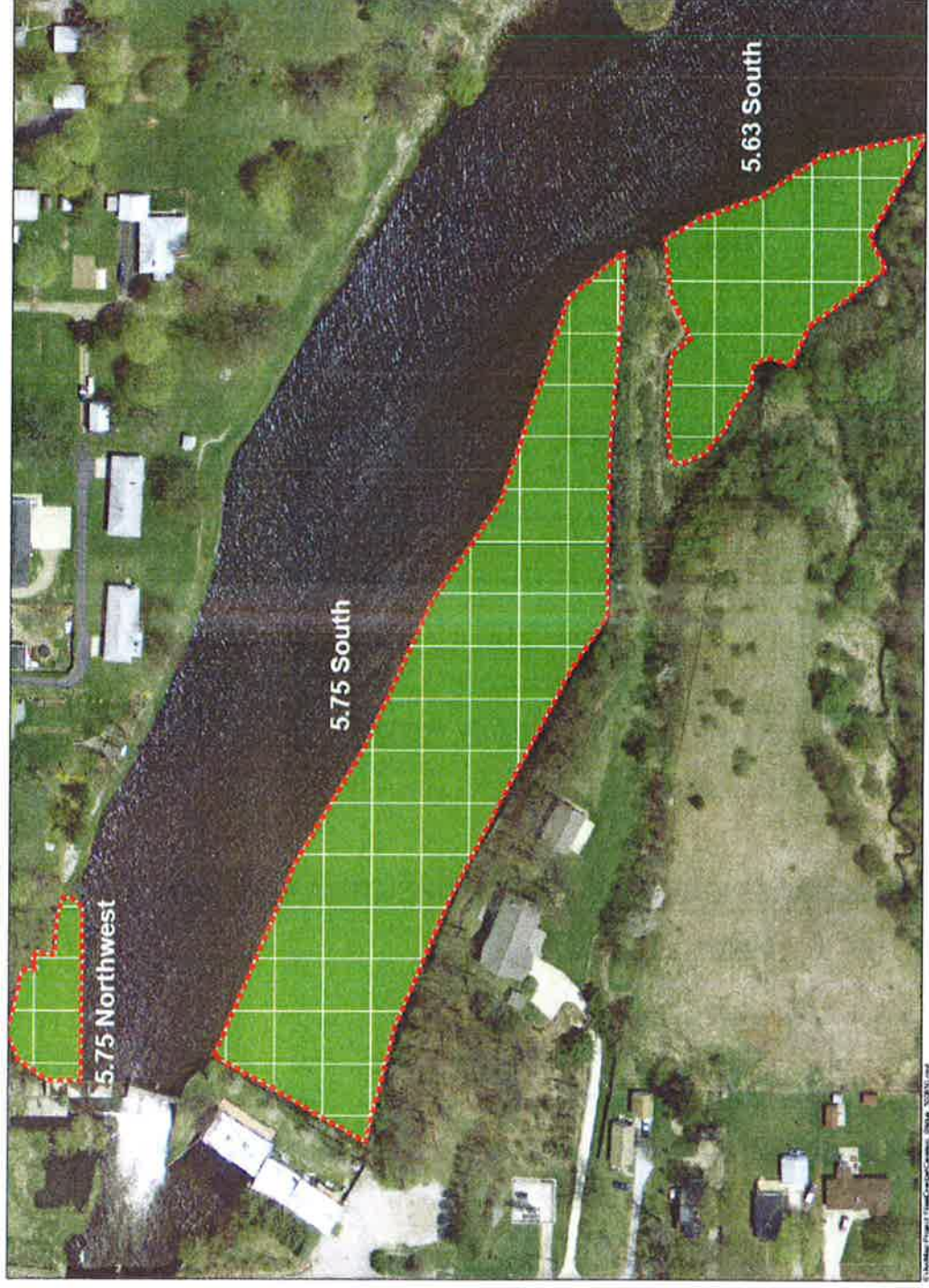
Enbridge:

Joe Kackos

J/Kackos 0272

10/24/10

Daily Progress Tracking Ceresco Dam Dredging



Legend

- Priority Areas
- Dredging Cell
- Dredging Complete
- Dredging In-Progress

Dredging Complete
Through 10/24/10:
5.75 Northwest: 100%
5.75 South: 100%
5.63 South: 100%

Treated Water Discharge:
299,000 Gallons on 10/24/10



1 Inch = 80 Feet

Coordinate System: Michigan State Plane North
Datum: North American 1983
Units: Feet
Scale: Horizontal 1" = 80'

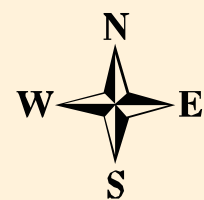
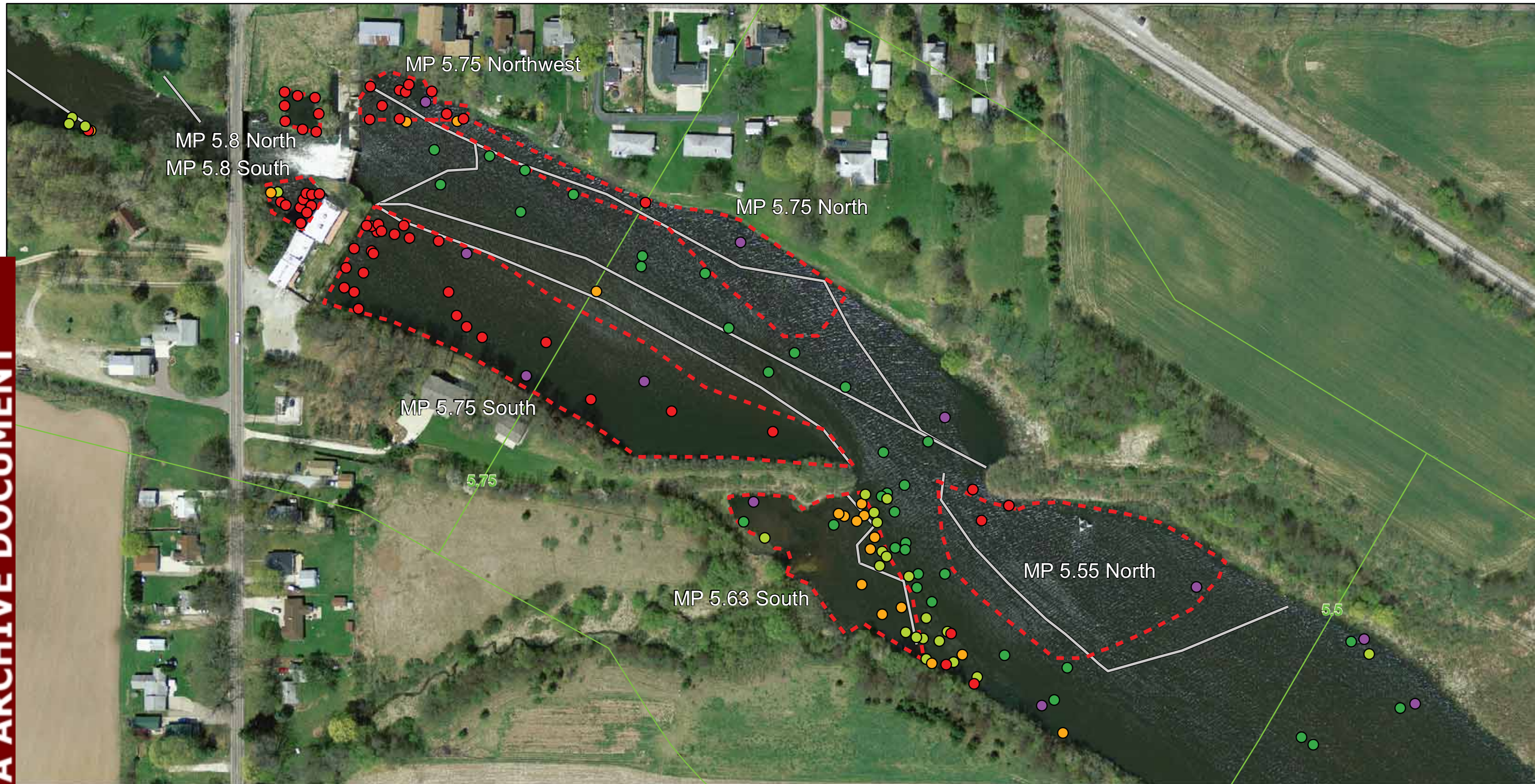
DREDGING PROGRESS MAP
CERESCO DAM
SUBMERGED OIL TASK FORCE
CERESCO, MICHIGAN
October 24, 2010



SITE SUMMARY – MP 5.63 – SOUTH AREA 37

The information provided below shall be used by the field teams to better understand site specific characteristics of the priority locations and determine the most appropriate recovery technology.

Site Location:	MP 5.63 – South 37
Site Layout:	See Figure Attached
Description and Geomorphic Setting:	Shallow cover on left bank looking downstream.
Approximate Areal Extent:	~1 acre
Approximate Depth of Water:	0 to 0.5 feet
Sediment thickness:	2+ feet
Bed type:	Soft sediment
Data Collected:	
Poling (Y/N)	Y
Cores (Y/N)	Y
Lab analysis (Y/N)	Y
Community Description and Habitat Quality:	High quality habitat has been impacted. Aquatic beds dominated by <i>Peltandra</i> and <i>Nymphaea</i> have been cut. Remnant vegetation includes <i>Sparganium</i> ,. Some large (half-dollar sized) snails noted on the bottom. Potential fish spawning habitat for grass pickerel, Northern pike and other grass spawners. Turtle habitat and green frog observed. Also habitat for wading birds, shorebirds, rails, waterfowl and muskrat.
Containment:	500' 18" hard boom, 400' X-Text
Access Issues:	None
Miscellaneous:	N/A
Recommendations:	ECO: Due to the extent of oil sheen observed in this area, dredging may be unavoidable. MDNRE will require mitigation for disturbance to the marsh, which shows up much larger on areal photos than existing. SOTF: Combination of aeration and shoreline dredging



0 150 300
1 inch = 150 feet

Legend

Pre Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy
- Observed But Quantity Not Noted



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

**Poling Data Collected Through:
October 18, 2010**

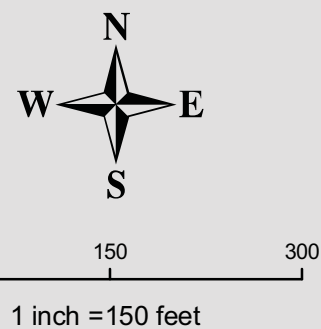
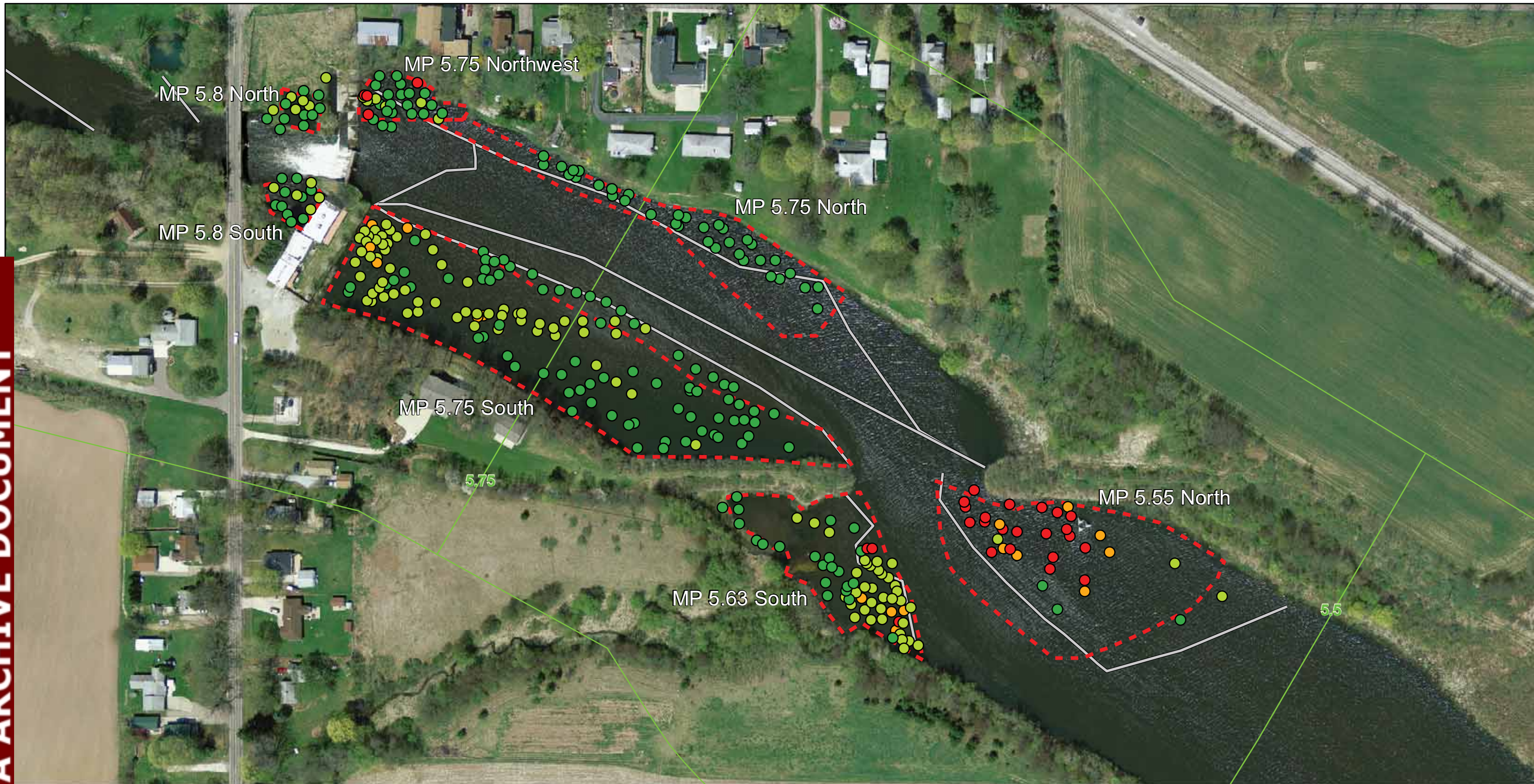
Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA PRE RECOVERY
QUALITATIVE RESULTS**
MP 5.55 N, MP 5.63 S, MP 5.75 N, MP 5.75 S,
MP 5.75 NW, MP 5.8 N, and MP 5.8 S

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 25, 2010





Legend

Post Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

**Poling Data Collected Through:
October 24, 2010**

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA POST RECOVERY
QUALITATIVE RESULTS**
MP 5.55 N, MP 5.63 S, MP 5.75 N, MP 5.75 S,
MP 5.75 NW, MP 5.8 N, and MP 5.8 S

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 26, 2010



PHOTOGRAPH LOG

Photograph 1

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.63 South

Date:
10/23/10

Description:
Recovery activities in progress – Amphibex dredging in cove near peninsula

View Direction:
Facing northwest



PHOTOGRAPH LOG

Photograph 2

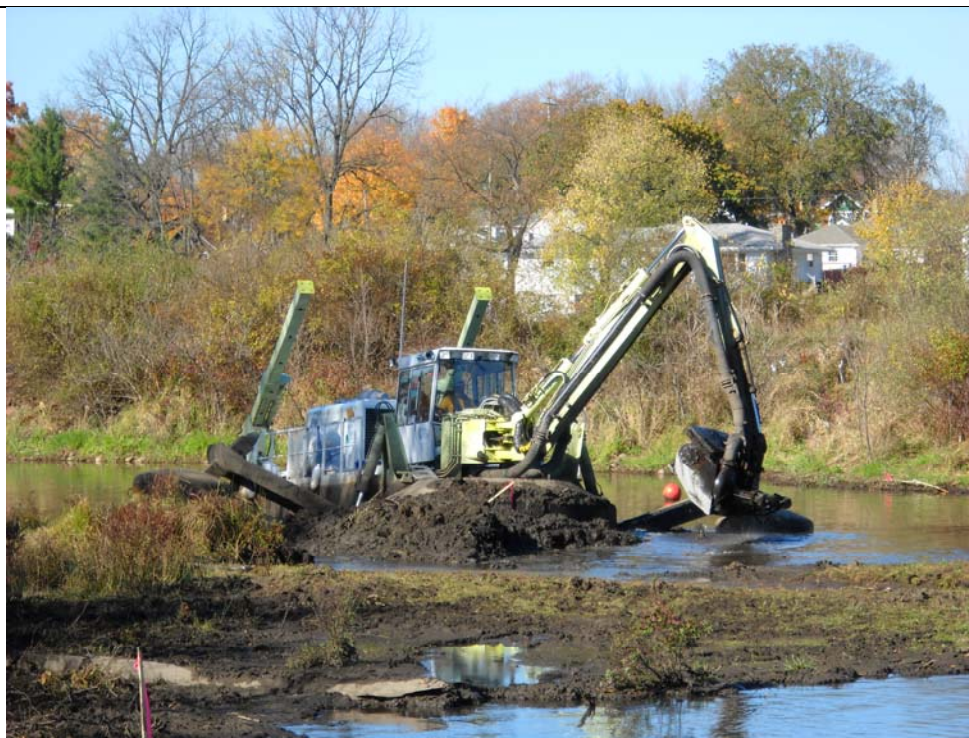
Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.63 South

Date:
10/23/10

Description:
Recovery activities in progress – Amphibex dredging in cove near peninsula

View Direction:
Facing northwest



PHOTOGRAPH LOG
Photograph 3

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.63 South

Date:
10/23/10

Description:
Recovery activities in progress – Amphibex dredging in cove near peninsula

View Direction:
Facing northwest

**PHOTOGRAPH LOG**
Photograph 4

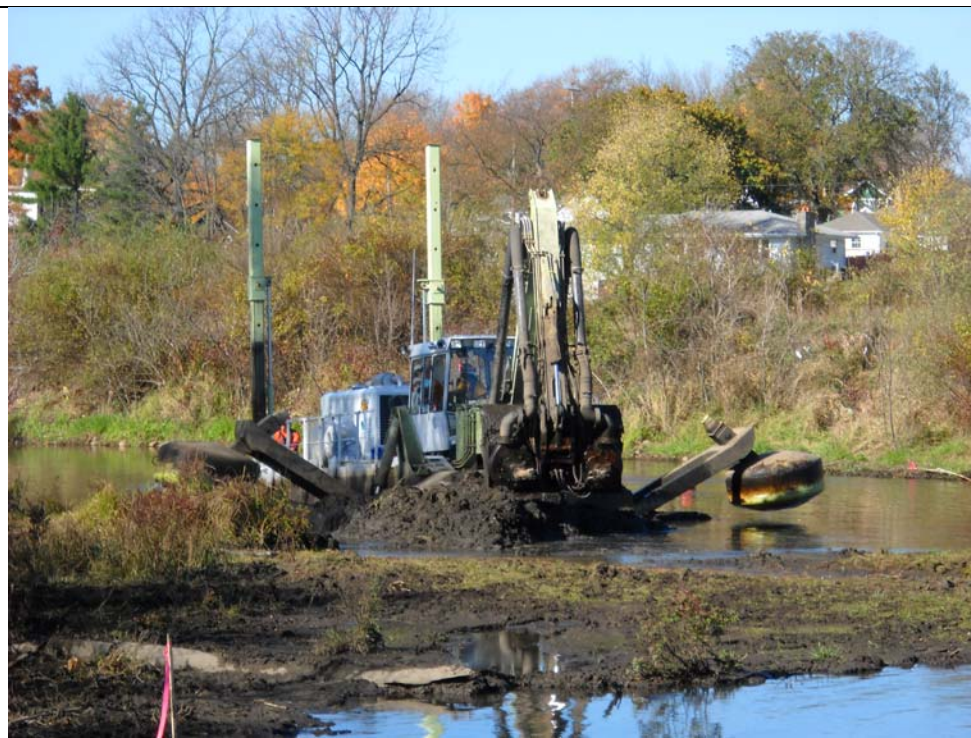
Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.63 South

Date:
10/23/10

Description:
Recovery activities in progress – Amphibex dredging in cove near peninsula

View Direction:
Facing northwest



PHOTOGRAPH LOG

Photograph 5

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.63 South

Date:
10/24/10

Description:
Recovery activities
complete – Dredging
complete

View Direction:
Facing south



PHOTOGRAPH LOG

Photograph 6

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.63 South

Date:
10/24/10

Description:
Recovery activities
complete – Dredging
complete

View Direction:
Facing south



PHOTOGRAPH LOG

Photograph 7

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.63 South

Date:
10/24/10

Description:
Recovery activities
complete – Dredging
complete

View Direction:
Facing south



PHOTOGRAPH LOG

Photograph 8

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.63 South

Date:
10/24/10

Description:
Recovery activities
complete – Dredging
complete

View Direction:
Facing west



**Enbridge Line 6B MP 608 Pipeline Release
Marshall, Michigan**

**Permanent Recovery of Submerged Oil and Oil-Contaminated
Sediments at Priority Locations**

**Submerged Oil Recovery Summary Report
Kalamazoo River MP 5.75 North (Ceresco Dam)**

Enbridge Energy

EXECUTIVE SUMMARY

A Submerged Oil Task Force (SOTF) was created on Tuesday, August 24, 2010, to perform field assessment, characterization, and mapping of submerged oil impacts in surface water and sediments of Talmadge Creek, Kalamazoo River and Morrow Lake (Talmadge Creek to Kalamazoo River to River Mile Post [RMP] 40). The SOTF is comprised of representatives from the United States Environmental Protection Agency (USEPA), the Michigan Department of Natural Resources and the Environment (MDNRE), Stakeholders, Enbridge and their contractors.

As a result of the initial field assessments, 34 sites in the Kalamazoo River had been identified as potentially containing accumulations of significant amounts of submerged oil in river sediments. These areas were further investigated, and 18 were identified as high priority areas and were recommended for submerged oil recovery by the SOTF. These 18 priority areas were also subjected to an ecological habitat assessment intended to classify their ecological use and value to help guide cleanup operations. The SOTF discussed the assessment in conjunction with possible cleanup approaches, and in a September 21, 2010 memorandum the Task Force Leaders provided recommendations for oil removal for these 18 priority areas.

Initial Assessment

The Qualitative Assessment was a reconnaissance effort to identify areas with the presence of submerged oil, identify depositional areas, prioritize sites based on a relative comparison of impacted sites, and obtain information on the depositional and erosional characteristics of geomorphic settings in which the impacted sites were identified. This was accomplished by in-channel sediment poling, which consisted of inserting a graduated metal pole equipped with a foot disk, into the sediment and recording visual evidence of oil, sheen (light, moderate, or heavy), droplets, globules, and/or tar balls after the sediment was agitated. Each poling location was located by GPS, with the elevation of the water surface, depth of water, top of sediment, and depth of soft sediment recorded. The primary criterion for prioritizing sites for quantitative sampling was the visual presence of oil in the qualitative phase. These areas were identified by the Tetra Tech field scientists. Depositional areas of the river were mapped and targeted for sampling during the quantitative sampling program.

RMP 5.75 North - (Ceresco Dam)

MP 5.75 North is approximately 1,000 feet of shoreline along the north shore of the Kalamazoo River on the right bank, looking downstream, running eastward from Ceresco Dam to the power/telephone right-of-way crossing. The approximate areal extent of this priority location is 1 acre and the depth to water is 0.5 to 1.5 feet near shore, deeper near the former silt curtain. The soft sediment thickness in this area is greater than 2 feet, except near shore where soft sediments thin.

Actions

MP 5.75 North was divided into 10 linear cells for oil recovery purposes (please refer to the sign-off sheet in the attachments for a sketch of the cell layout). However, cells 8, 9, and 10, located in the northwest corner of this area, closest to the dam, were deemed too oiled for effective aeration. This designation was determined after repeated passes without substantial results. These three cells had been reported to contain heavy concentrations of submerged oil with large globules observed. As a result these three cells were added to the dredging program

(please refer to MP 5.75 Northwest, which discusses the dredging activities associated with Ceresco Dam).

Oil recovery activities ran from September 30, 2010, through October 4, 2010, then again from October 10 through 14, 2010. The cells were aerated with combination of the pond aerators, water flushing wands, and manual sweeping with workers walking inline in waders. Over the two week time period multiple aeration passes occurred in cells 1 through 7. Oil was collected by sweeping each cell with absorbent boom, leaf blowers, absorbent pads and skimmers. On October 14, 2010, cells 1 through 7 of priority site MP 5.75 North were recommended for final sign-off.

Outcome

The site was visited by USEPA and Enbridge representatives on October 17, 2010. The USEPA and Enbridge representatives entered the site by airboat and in cells 1 through 7 no discernable oil was present. Site MP 5.75 North, cells 1 through 7, were cleared and received final sign-off. Cells 8 through 10 were addressed through dredging.

Attachment Descriptions

The ensuing information listed below directly follows in this Submerged Oil Recovery Summary Report:

- USEPA and Enbridge signed Submerged Oil Remediation Status Tracking Form.
 - Contains signatory approvals.
- Site Summary
 - Provides information used by the field teams to better understand site specific characteristics of the priority locations and determined the most appropriate recovery technology. Information included site layout, areal extent, depth to water, sediment thickness, sediment bed type, data collected, habitat description and habitat quality, containment measures, access, and recommendations.
- Pre- and Post- Submerged Oil Recovery Figures
 - Presents qualitative pre- and post- poling data in a graphical format.
- Photographs
 - Provides visual documentation of pre- and post- submerge oil recovery activities.

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 10-16-2010

EPA(REP): Brennan Pierce

ENBRIDGE(REP): Mike Blevin /Robert Suehs

LOCATION
(Division/Sect/MP)

MP 5.75 N

CLEANUP METHODS USED

Method: aeration Notes: 9 cells (1,-9 green); cell 10 aerated but still red

Method: Water flush Notes: Water flushed cell 10, numerous flushes

Method: Notes:

OIL COLLECTION METHODS USED

Method: Sorbent pads---

Method: sorbent booms

DISCERNABLE OIL
OBSERVED (end of day)

Cells 1-7-no
discernable oil

Cell 8-10 : oil still present

Sheen(heavy, medium, **light**)

No oil in cells 1-7
Yes cells-8-10

Globules yes cell 10

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): Yes: cells 1-7 only; recommend remainder of site (cells 8-10) be identified for Dredging

Team Lead: Mike Blevin

Remediation Complete
SITE APPROVAL

Name

Signature

Date

EPA:

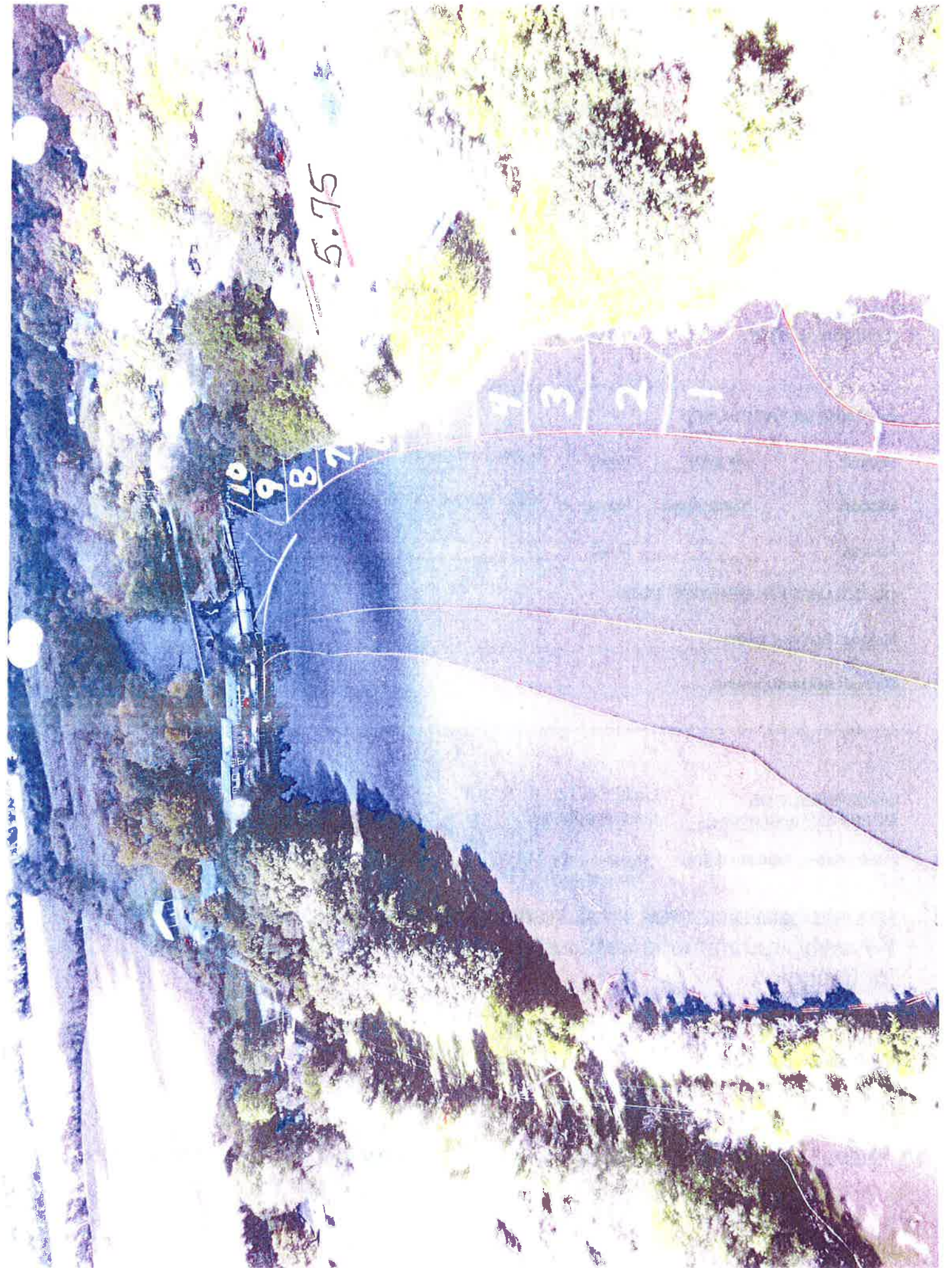
Paul R. Brennan

Enbridge:

Joe Kackos

[Signature]
J. Kackos 0272

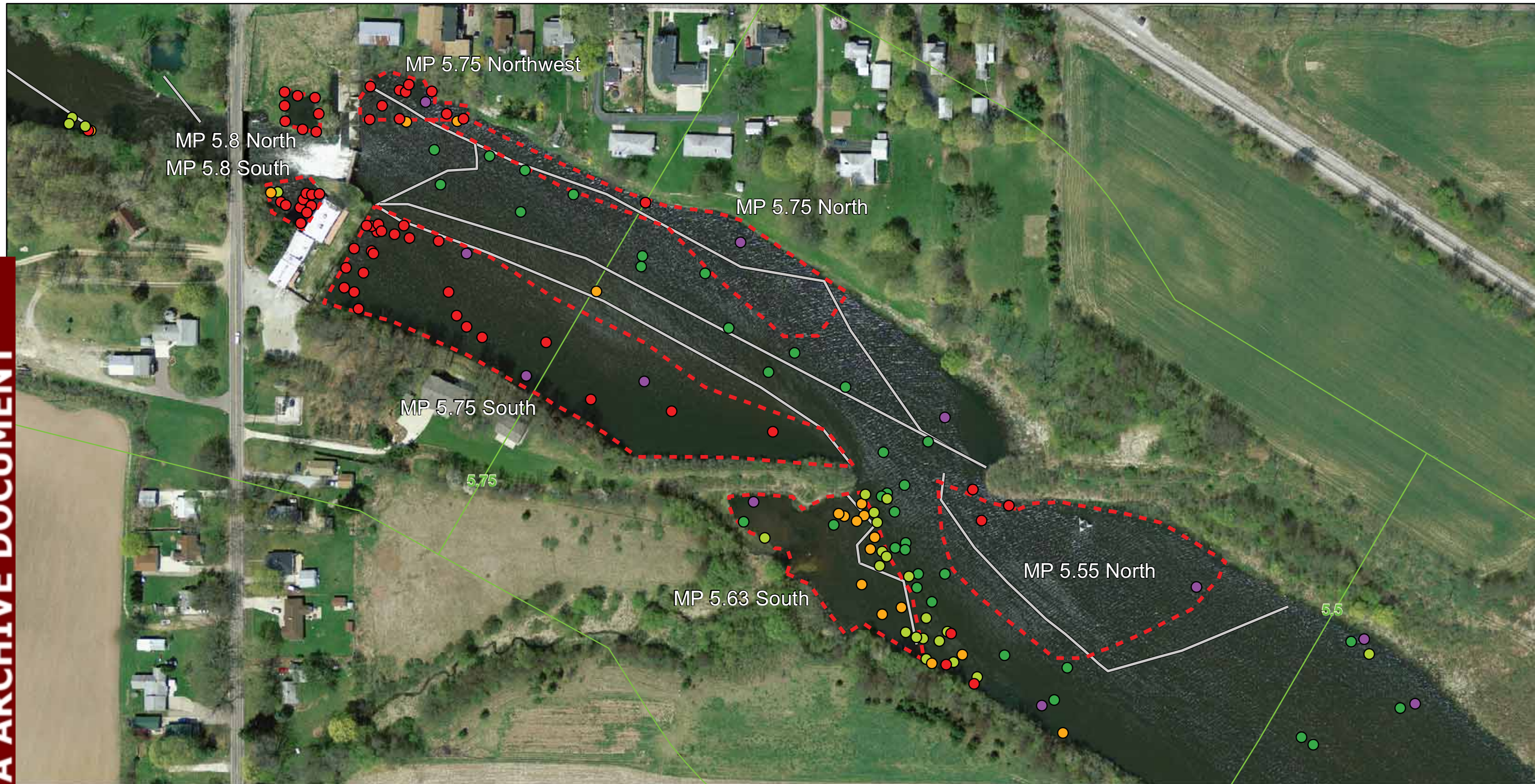
10/17/2010
10/17/10



SITE SUMMARY – 5.75 CERESCO DAM NORTH

The information provided below shall be used by the field teams to better understand site specific characteristics of the priority locations and determine the most appropriate recovery technology.

Site Location:	MP 5.75 Ceresco Dam North
Site Layout:	See Figure Attached
Description and Geomorphic Setting:	Shoreline area on right bank looking downstream. An additional area exists at MP 5.5 on the right bank looking downstream. Both areas are upstream of Ceresco Dam.
Approximate Areal Extent:	~1 acre
Approximate Depth of Water:	0.5 to 1.5 feet towards shore, deeper near silt curtain
Sediment thickness:	2+ feet, except near shore where soft sediment thins
Bed type:	Soft sediment, sand and gravel near shore
Data Collected:	
Poling (Y/N)	Y
Cores (Y/N)	Y
Lab analysis (Y/N)	Y
Community Description and Habitat Quality:	<p>High quality habitat has been impacted. Emergent aquatic vegetation beds dominated by <i>Pontedaria</i> have been mowed. The area provides juvenile and adult fish feeding habitat for largemouth bass and sunfishes. It also provides waterfowl and wading bird habitat.</p> <p>Second area on the right bank has cut vegetation and water depth of 6 inches. The aquatic bed formerly consisted of water lilies (probably <i>Nymphaea</i>), and <i>Sparganium</i>. Submerged aquatics such as <i>Ceratophyllum</i> and <i>Potamogeton</i> are still present.</p>
Containment:	1200' sediment curtain, 6' skirt
Access Issues:	None
Miscellaneous:	N/A
Recommendations:	<p>ECO: This area has already been impacted and if dredged would require mitigation. If possible, these and the two areas above should be allowed to regenerate, with dredging limited to the channels and open water areas.</p> <p>SOTF: Combination of aeration and shoreline dredging</p>



Legend

Pre Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy
- Observed But Quantity Not Noted



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

**Poling Data Collected Through:
October 18, 2010**

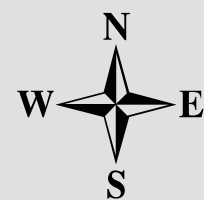
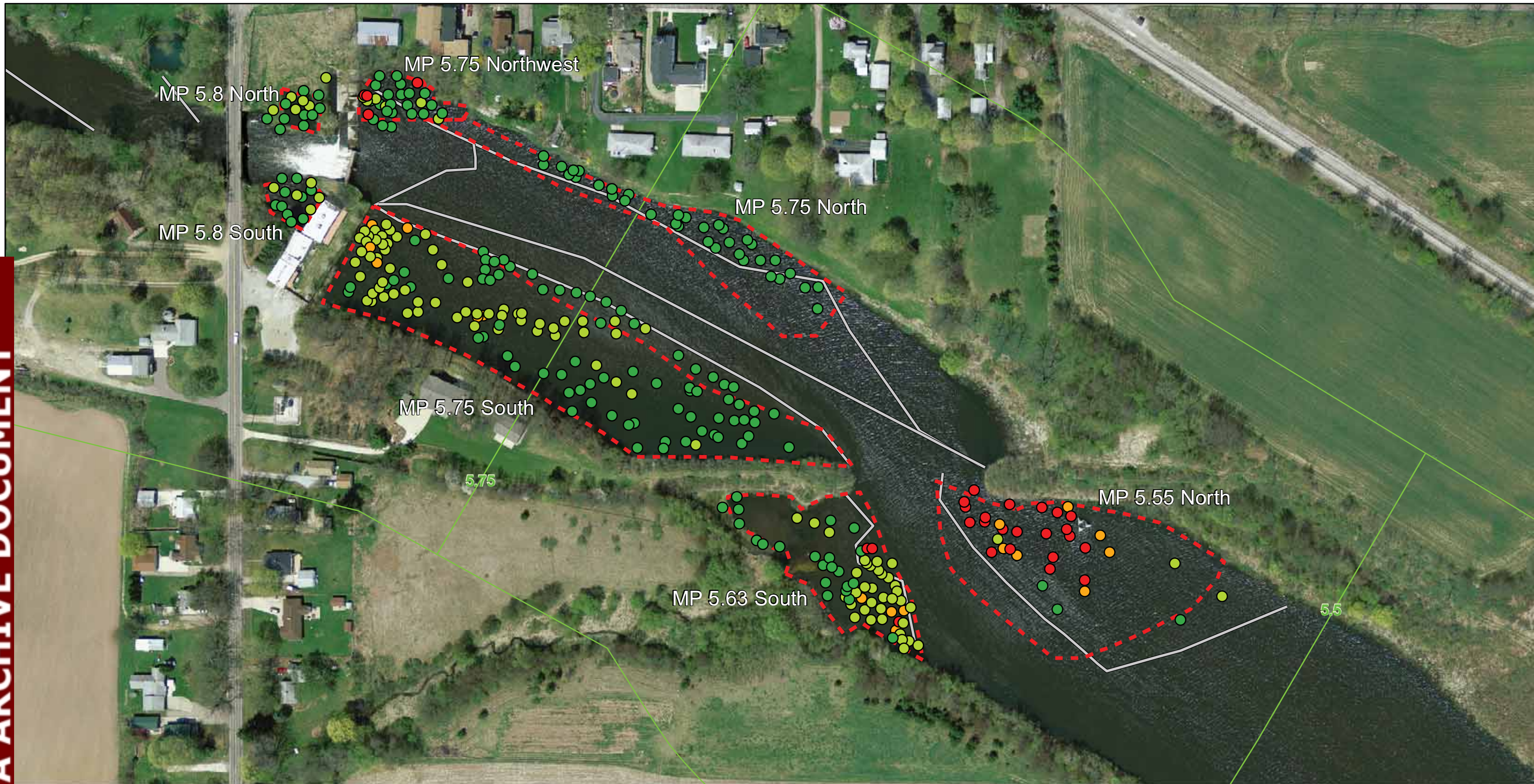
Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA PRE RECOVERY
QUALITATIVE RESULTS**
MP 5.55 N, MP 5.63 S, MP 5.75 N, MP 5.75 S,
MP 5.75 NW, MP 5.8 N, and MP 5.8 S

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 25, 2010





0 150 300

1 inch = 150 feet

Legend

Post Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

**Poling Data Collected Through:
October 24, 2010**

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA POST RECOVERY
QUALITATIVE RESULTS**
MP 5.55 N, MP 5.63 S, MP 5.75 N, MP 5.75 S,
MP 5.75 NW, MP 5.8 N, and MP 5.8 S

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 26, 2010



TETRA TECH EC, INC.

PHOTOGRAPH LOG

Photograph 1

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.75 North

Date:
10/12/10

Description:
Recovery activities in
progress – water washing

View Direction:
Facing east



PHOTOGRAPH LOG

Photograph 2

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.75 North

Date:
10/12/10

Description:
Recovery activities in
progress - water washing

View Direction:
Facing northwest



PHOTOGRAPH LOG

Photograph 3

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.75 North

Date:
10/12/10

Description:
Recovery activities in
progress – water washing

View Direction:
Facing northwest



PHOTOGRAPH LOG

Photograph 4

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.75 North

Date:
10/12/10

Description:
Recovery activities in
progress – boom and pad
collection of oil

View Direction:
Facing northeast



PHOTOGRAPH LOG
Photograph 5

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.75 North

Date:
10/24/10

Description:
Post Recovery - Aeration
and washing activities
complete

View Direction:
Facing northwest

**PHOTOGRAPH LOG**
Photograph 6

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.75 North

Date:
10/24/10

Description:
Post Recovery - Aeration
and washing activities
complete

View Direction:
Facing northwest



PHOTOGRAPH LOG
Photograph 7

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.75 North

Date:
10/24/10

Description:
Post Recovery - Aeration
and washing activities
complete

View Direction:
Facing northeast

**PHOTOGRAPH LOG**
Photograph 8

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.75 North

Date:
10/24/10

Description:
Post Recovery - Aeration
and washing activities
complete

View Direction:
Facing northeast



**Enbridge Line 6B MP 608 Pipeline Release
Marshall, Michigan**

**Permanent Recovery of Submerged Oil and Oil-Contaminated
Sediments at Priority Locations**

**Submerged Oil Recovery Summary Report
Kalamazoo River MP 5.75 Northwest
(Ceresco Dam)**

Enbridge Energy

EXECUTIVE SUMMARY

A Submerged Oil Task Force (SOTF) was created on Tuesday, August 24, 2010, to perform field assessment, characterization, and mapping of submerged oil impacts in surface water and sediments of Talmadge Creek, Kalamazoo River and Morrow Lake (Talmadge Creek to Kalamazoo River to River Mile Post [RMP] 40). The SOTF is comprised of representatives from the United States Environmental Protection Agency (USEPA), the Michigan Department of Natural Resources and the Environment (MDNRE), Stakeholders, Enbridge and their contractors.

As a result of the initial field assessments, 34 sites in the Kalamazoo River had been identified as potentially containing accumulations of significant amounts of submerged oil in river sediments. These areas were further investigated, and 18 were identified as high priority areas and were recommended for submerged oil recovery by the SOTF. These 18 priority areas were also subjected to an ecological habitat assessment intended to classify their ecological use and value to help guide cleanup operations. The SOTF discussed the assessment in conjunction with possible cleanup approaches, and in a September 21, 2010 memorandum the Task Force Leaders provided recommendations for oil removal for these 18 priority areas.

Initial Assessment

The Qualitative Assessment was a reconnaissance effort to identify areas with the presence of submerged oil, identify depositional areas, prioritize sites based on a relative comparison of impacted sites, and obtain information on the depositional and erosional characteristics of geomorphic settings in which the impacted sites were identified. This was accomplished by in-channel sediment poling, which consisted of inserting a graduated metal pole equipped with a foot disk, into the sediment and recording visual evidence of oil, sheen (light, moderate, or heavy), droplets, globules, and/or tar balls after the sediment was agitated. Each poling location was located by GPS, with the elevation of the water surface, depth of water, top of sediment, and depth of soft sediment recorded. The primary criterion for prioritizing sites for quantitative sampling was the visual presence of oil in the qualitative phase. These areas were identified by the Tetra Tech field scientists. Depositional areas of the river were mapped and targeted for sampling during the quantitative sampling program.

RMP 5.75 Northwest - (Ceresco Dam)

MP 5.75 Northwest is approximately 1,000 feet of shoreline along the north shore of the Kalamazoo River on the right bank, looking downstream, running eastward from Ceresco Dam to the power/telephone right-of-way crossing. MP 5.75 North was divided into 10 cells for oil recovery purposes. However, cells 8, 9, and 10, located in the northwest corner, closest to the dam, were deemed too oiled for effective aeration. This designation was determined after repeated passes without substantial results. These three cells had reported heavy concentrations of submerged oil with large globules observed. As a result these three cells were added to the dredging program.

The dredged sediment was pumped into Geotubes for dewatering with the use of polymers to enhance settling of suspended solids. Within the dewatering and treatment area, weep water was captured in a lined sump, which in turn was pumped into a water treatment system prior to discharge into the Kalamazoo River in accordance with a MDNRE NPDES Permit.

Actions

Submerged oil recovery activities by dredging occurred from September 29th 2010, through October 24, 2010. Priority areas 5.63 South, 5.75 South, and the 5.75 NW were hydraulically dredged. Operations were conducted primarily during the daylight hours of 0800 to 2100. Nighttime operations were considered, but not implemented due to the close proximity of the residential locations. Approximately 6,800 cubic yards of sediment and an undetermined volume of recoverable oil were collected in 9 Geotubes and the water treatment system. The range of depth of sediment removed was from 1.5 to 2 feet. Generally, depth of removal increased as the cut approached the face of the dam. The project was delivered ahead of schedule and without health and safety incident.

From an environmental function, project management executed the collection and analysis of the following sets of performance management data:

1. Effluent samples at a frequency above and beyond the requirements of the NPDES permit were collected throughout the process.
2. Continuous on site and perimeter real time air monitoring, air samples, and noise readings during the periods of operation
3. Daily surface water quality analyte samples and
4. Continuous surface water quality real time measurements for such parameters as turbidity, pH and temperature.

The environmental data manager effectively managed and delivered this data from multiple sources in a timely manner for onsite project management. These sets of data were used to demonstrate best management practices during the course of the dredging activity. Please refer to the site workplan for more details concerning these data sets. The following documents the overall findings of these data sets:

1. All NPDES requirements were met during the period of operation.
2. Real time air monitoring before and during the 25 days of Ceresco dredging operations documented 2 benzene detects out of approximately 2,240 readings and 16 volatile organic compound (VOC) detection out of approximately 5,770 readings. The maximum concentration was 1 part per million (ppm) for benzene and 0.9 ppm for VOCs, respectively. The overwhelming majority of analytical samples showed no crude oil-related analytes of interest were detected. These air monitoring and sample results confirm that air quality was not adversely impacted by dredging activities. Odor complaints due to dredging operations were not reported.
3. Noise monitoring was conducted daily within the Ceresco community as well as the work area. Complaints of excessive noise due to dredging operations were not reported.

4. Surface water samples were collected daily from the following three locations, upstream of dredging operations, downstream of operations but upstream of the dam, and downstream of the dam just west of the final containment measures. VOCs and semi-VOCs concentrations were less than reporting detection limit for the samples collected. Concerning metals, relatively minor concentrations of iron, lead, zinc, and manganese were detected sporadically during the sampling program at all 3 locations. The results demonstrate that surface water quality was not adversely impacted by dredging operations.
5. Continuous measurements of turbidity, pH, dissolved oxygen, specific conductivity, and temperature collected by Eureka Environmental Manta 2 Multiprobes at downstream and upstream locations of dredging operations. Turbidity measurements were successfully used as part of the best management practices to ensure that dredging operations did not create sustained periods of downstream turbidity greater than two times upstream. Containment boom and turbidity curtains placement and maintenance successfully contained sheen and turbidity within the dredging area.

From an operational perspective, the following actions constituted the significant elements which led to the success of the project:

1. The framework of the workplan allowed for ample design, detail and flexibility to provide for an organized and effective construction of the main execution components of treatment pad, treatment system, hydraulic dredge sediment removal, sediment and oil containment measures and geobag management. The flexibility and delegation to field decision makers allowed for rapid and effective response to changing site conditions.
2. The construction manager effectively coordinated in an anticipatory mode with several layers of management to execute construction components such as drainage pad construction, water treatment system installation and multiple dredge use ahead of construction schedule.
3. Excellence in trades and health & safety operations was maintained thru rigorous multiple layer coordination, onsite safety officer excellence and the awareness of onsite workers.
4. Innovative solutions were executed to overcome obstacles:
 - a. Debris location in the dredge zones ahead of dredger using techniques such as pre-poling and metals detecting instrumentation.
 - b. Innovative use of multiple sediment curtain layers of varying types and uses such as carbon impregnated layered material and attaching boom to the moving dredge in a containment pattern
 - c. Maintaining rapid access and deployment for critical dredge components that allowed for efficient repairs typical of dredge projects with significantly reduced down time.

- d. Use and efficient execution of the shallow water, high solids Amphibex dredger
- e. Rapid mobilization of 2 additional dredges and successful simultaneous execution of 3 dredgers which was necessary to meet the expanded scope and provide overall project savings by reducing the original schedule timeline by approximately a week.

Outcome

The site was visited by USEPA and Enbridge representatives on October 23, 2010. Site MP 5.75 Northwest was cleared and received final sign-off.

Attachment Descriptions

The ensuing information listed below directly follows in this Submerged Oil Recovery Summary Report:

- USEPA and Enbridge signed Submerged Oil Remediation Status Tracking Form.
 - Contains signatory approvals.
- Site Summary
 - Provides information used by the field teams to better understand site specific characteristics of the priority locations and determined the most appropriate recovery technology. Information included site layout, areal extent, depth to water, sediment thickness, sediment bed type, data collected, habitat description and habitat quality, containment measures, access, and recommendations.
- Pre- and Post- Submerged Oil Recovery Figures
 - Presents qualitative pre- and post- poling data in a graphical format.
- Photographs
 - Provides visual documentation of pre- and post- submerge oil recovery activities.

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 10-22-2010

EPA(REP): John Verlac

ENBRIDGE(REP): Mike Smiley /Robert Suehs/Dave Murphy Dan Sullivan TetraTech (dredging)

LOCATION
(Division/Sect/MP) MP 5.75 NW Ceresco Dam

Cells 8-10 recommended for dredging (10/4) after 4 days of aeration treatment

CLEANUP METHODS USED

Method: aeration Notes: 4 cells all cells aerated X 2-3 times each, but still red

Method: Dredging Notes: Site (cells 8-10) dredged referred to as 5.75NW

Method: Notes:

OIL COLLECTION METHODS USED

Method: sorbent boom , pads

Method:

DISCERNABLE OIL
OBSERVED (end of day) No, area fully dredged

Sheen(heavy, medium, light) no

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): Yes

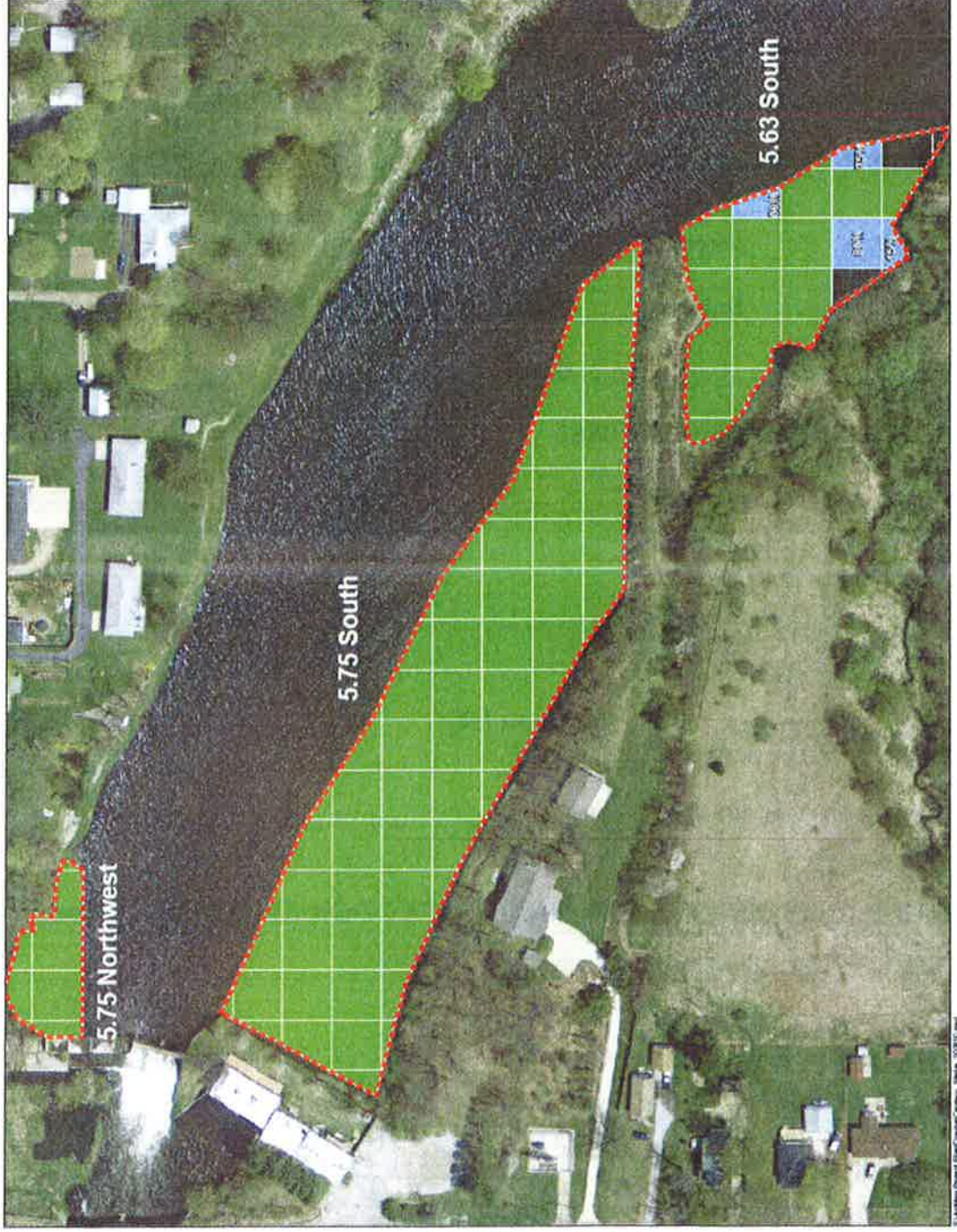
Team Lead: Mike Blevin/Dave Murphy

Remediation Complete

SITE APPROVAL

	Name	Signature	Date
EPA:	LEOTRANCENDEJO		10/23/10
Enbridge:	Joe Kackos	 0272	10/23/10

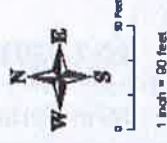
Daily Progress Tracking Ceresco Dam Dredging



Legend

- Priority Areas
- Dredging Cell
- Dredging Complete
- Dredging In-Progress

Dredging Complete
Through 10/22/10:
5.75 Northwest: 100%
5.75 South: 100%
5.63 South: 71%
Treated Water Discharge:
731,000 Gallons on 10/22/10



Coordinate System: Michigan State Plane State
North America Datum: NAD83
Units: US Survey Feet
Units: International Feet

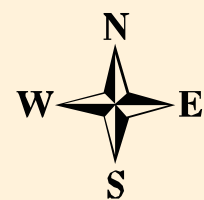
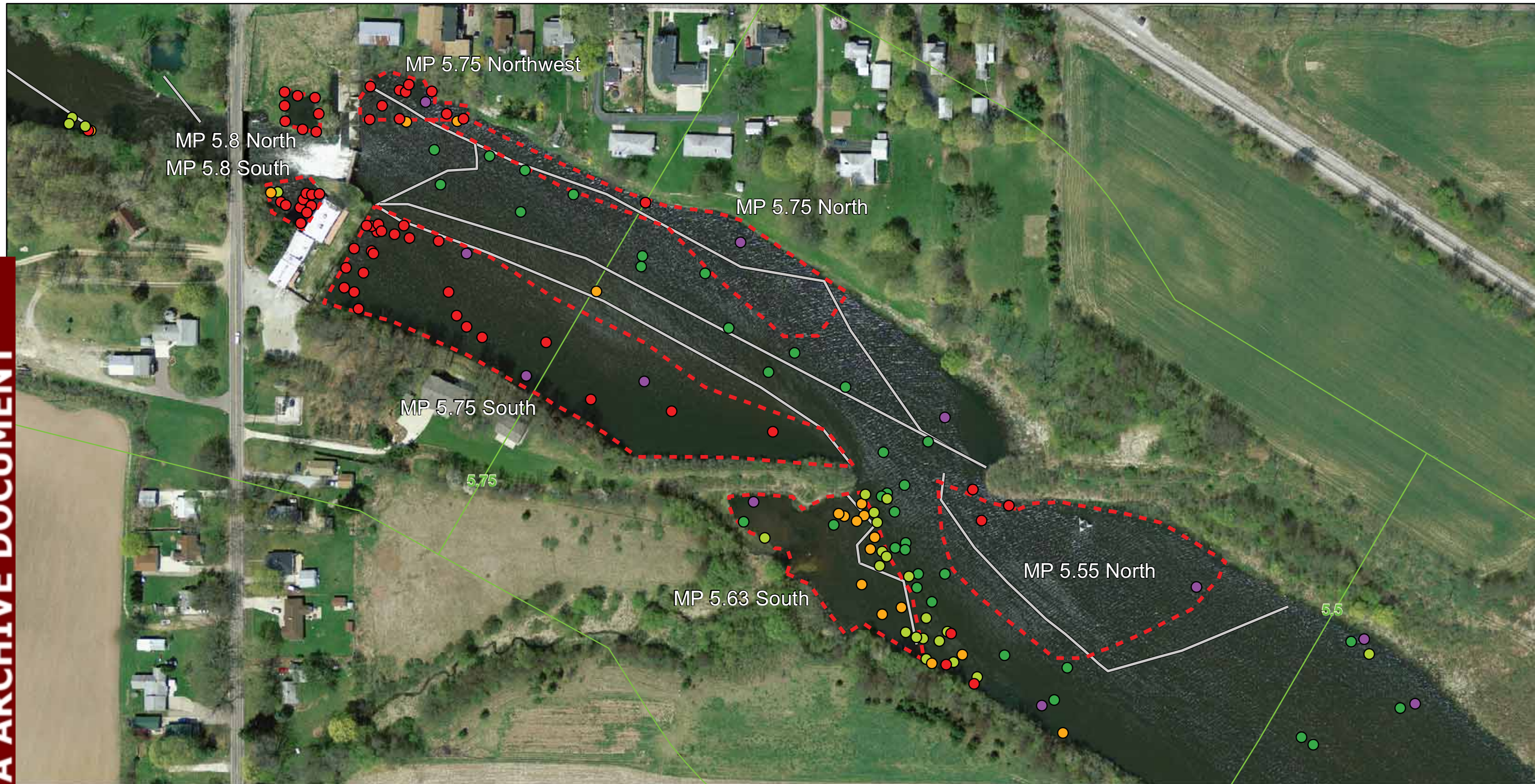
DREDGING PROGRESS MAP
CERESCO DAM
SUBMERGED OIL TASK FORCE
CERESCO, MICHIGAN
October 22, 2010



SITE SUMMARY – 5.75 CERESCO DAM NORTH

The information provided below shall be used by the field teams to better understand site specific characteristics of the priority locations and determine the most appropriate recovery technology.

Site Location:	MP 5.75 Ceresco Dam North
Site Layout:	See Figure Attached
Description and Geomorphic Setting:	Shoreline area on right bank looking downstream. An additional area exists at MP 5.5 on the right bank looking downstream. Both areas are upstream of Ceresco Dam.
Approximate Areal Extent:	~1 acre
Approximate Depth of Water:	0.5 to 1.5 feet towards shore, deeper near silt curtain
Sediment thickness:	2+ feet, except near shore where soft sediment thins
Bed type:	Soft sediment, sand and gravel near shore
Data Collected:	
Poling (Y/N)	Y
Cores (Y/N)	Y
Lab analysis (Y/N)	Y
Community Description and Habitat Quality:	<p>High quality habitat has been impacted. Emergent aquatic vegetation beds dominated by <i>Pontedaria</i> have been mowed. The area provides juvenile and adult fish feeding habitat for largemouth bass and sunfishes. It also provides waterfowl and wading bird habitat.</p> <p>Second area on the right bank has cut vegetation and water depth of 6 inches. The aquatic bed formerly consisted of water lilies (probably <i>Nymphaea</i>), and <i>Sparganium</i>. Submerged aquatics such as <i>Ceratophyllum</i> and <i>Potamogeton</i> are still present.</p>
Containment:	1200' sediment curtain, 6' skirt
Access Issues:	None
Miscellaneous:	N/A
Recommendations:	<p>ECO: This area has already been impacted and if dredged would require mitigation. If possible, these and the two areas above should be allowed to regenerate, with dredging limited to the channels and open water areas.</p> <p>SOTF: Combination of aeration and shoreline dredging</p>



0 150 300
1 inch = 150 feet

Legend

Pre Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy
- Observed But Quantity Not Noted



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

**Poling Data Collected Through:
October 18, 2010**

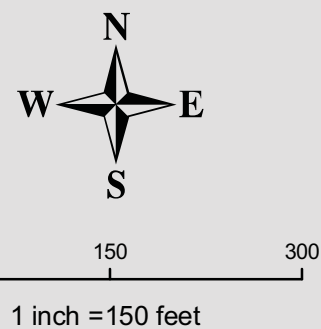
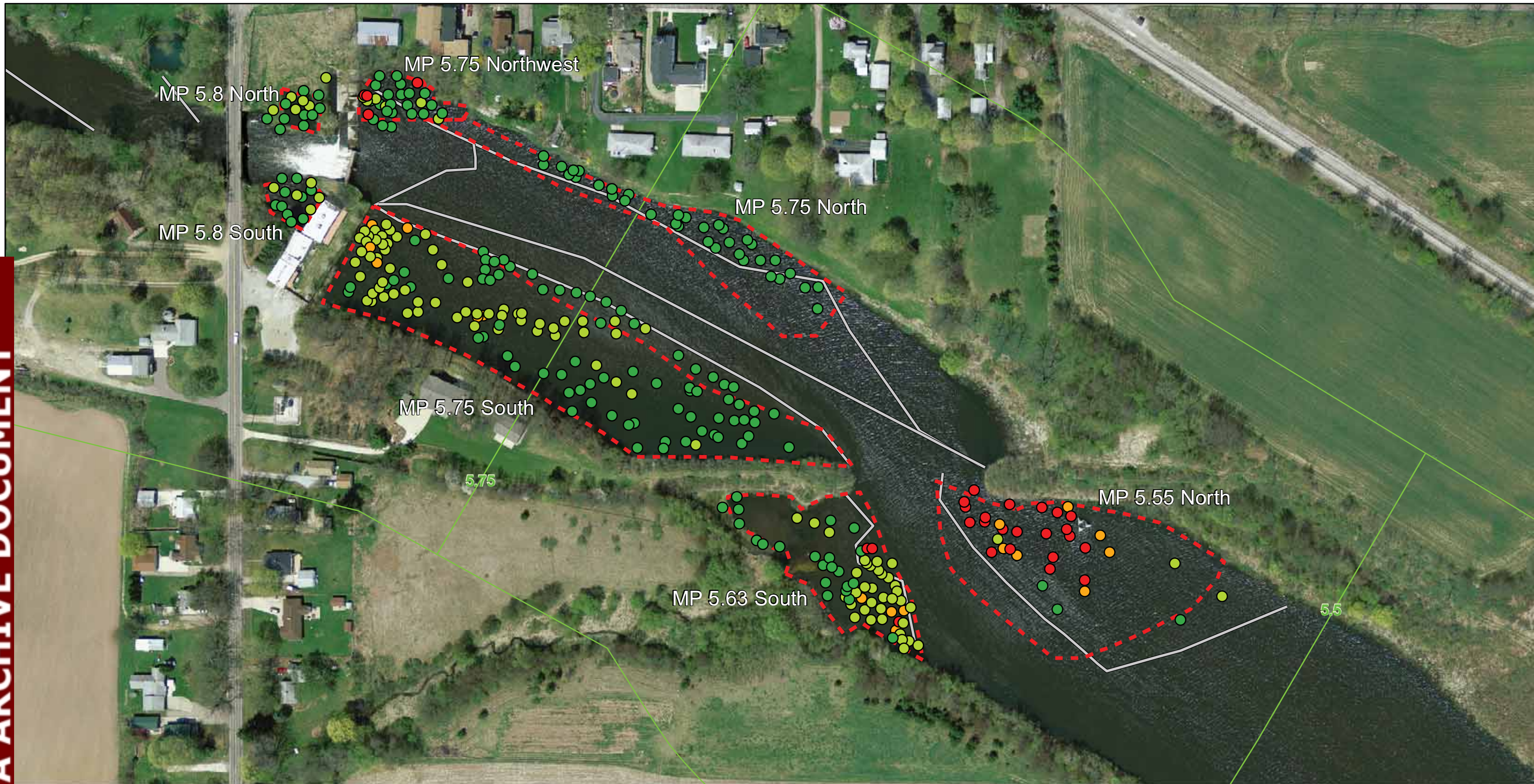
Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA PRE RECOVERY
QUALITATIVE RESULTS**
MP 5.55 N, MP 5.63 S, MP 5.75 N, MP 5.75 S,
MP 5.75 NW, MP 5.8 N, and MP 5.8 S

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 25, 2010





Legend

Post Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

**Poling Data Collected Through:
October 24, 2010**

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA POST RECOVERY
QUALITATIVE RESULTS**
MP 5.55 N, MP 5.63 S, MP 5.75 N, MP 5.75 S,
MP 5.75 NW, MP 5.8 N, and MP 5.8 S

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 26, 2010



PHOTOGRAPH LOG

Photograph 1

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.75 Northwest

Date:
10/23/10

Description:
Recovery activities in progress – Dredging with cutter-head dredge unit

View Direction:
Facing east



PHOTOGRAPH LOG

Photograph 2

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.75 Northwest

Date:
10/23/10

Description:
Recovery activities in progress – Dredging with cutter-head dredge unit

View Direction:
Facing east



PHOTOGRAPH LOG

Photograph 3

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.75 Northwest

Date:
10/24/10

Description:
Recovery activities
complete – Dredging
complete

View Direction:
Facing west



PHOTOGRAPH LOG

Photograph 4

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.75 Northwest

Date:
10/24/10

Description:
Recovery activities
complete – Dredging
complete

View Direction:
Facing north



**Enbridge Line 6B MP 608 Pipeline Release
Marshall, Michigan**

**Permanent Recovery of Submerged Oil and Oil-Contaminated
Sediments at Priority Locations**

**Submerged Oil Recovery Summary Report
Kalamazoo River MP 5.75 South
(Ceresco Dam)**

Enbridge Energy

EXECUTIVE SUMMARY

A Submerged Oil Task Force (SOTF) was created on Tuesday, August 24, 2010, to perform field assessment, characterization, and mapping of submerged oil impacts in surface water and sediments of Talmadge Creek, Kalamazoo River and Morrow Lake (Talmadge Creek to Kalamazoo River to River Mile Post [RMP] 40). The SOTF is comprised of representatives from the United States Environmental Protection Agency (USEPA), the Michigan Department of Natural Resources and the Environment (MDNRE), Stakeholders, Enbridge and their contractors.

As a result of the initial field assessments, 34 sites in the Kalamazoo River had been identified as potentially containing accumulations of significant amounts of submerged oil in river sediments. These areas were further investigated, and 18 were identified as high priority areas and were recommended for submerged oil recovery by the SOTF. These 18 priority areas were also subjected to an ecological habitat assessment intended to classify their ecological use and value to help guide cleanup operations. The SOTF discussed the assessment in conjunction with possible cleanup approaches, and in a September 21, 2010 memorandum the Task Force Leaders provided recommendations for oil removal for these 18 priority areas.

Initial Assessment

The Qualitative Assessment was a reconnaissance effort to identify areas with the presence of submerged oil, identify depositional areas, prioritize sites based on a relative comparison of impacted sites, and obtain information on the depositional and erosional characteristics of geomorphic settings in which the impacted sites were identified. This was accomplished by in-channel sediment poling, which consisted of inserting a graduated metal pole equipped with a foot disk, into the sediment and recording visual evidence of oil, sheen (light, moderate, or heavy), droplets, globules, and/or tar balls after the sediment was agitated. Each poling location was located by GPS, with the elevation of the water surface, depth of water, top of sediment, and depth of soft sediment recorded. The primary criterion for prioritizing sites for quantitative sampling was the visual presence of oil in the qualitative phase. These areas were identified by the Tetra Tech field scientists. Depositional areas of the river were mapped and targeted for sampling during the quantitative sampling program.

RMP 5.75 South - (Ceresco Dam)

MP 5.75 South is located along the left descending bank (also referred to as south shore) of the Kalamazoo River starting at the Ceresco Dam running for approximately 900 feet upstream by 200 feet in width.

The SOTF determined that Amphibex dredge technology would be used for dredging at the Ceresco Dam Priority Locations MP 5.63 South, MP 5.75 South, and MP 5.75 Northwest (Cells 8, 9, and 10). The use of an Amphibex dredge excavator did not require an increase in the Kalamazoo River water elevation to float the equipment, as typically would be required for conventional dredging equipment. The dredging included approximately 4 acres of area at MP 5.75 South.

The dredged sediment was pumped into Geotubes for dewatering with the use of polymers to enhance settling of suspended solids. Within the dewatering and treatment area, weep water was captured in a lined sump, which in turn was pumped into a water treatment system prior to discharge into the Kalamazoo River in accordance with a MDNRE NPDES Permit.

Actions

Submerged oil recovery activities by dredging occurred from September 29th 2010, through October 24, 2010. Priority areas 5.63 South, 5.75 South, and the 5.75 NW were hydraulically dredged. Operations were conducted primarily during the daylight hours of 0800 to 2100. Nighttime operations were considered, but not implemented due to the close proximity of the residential locations. Approximately 6,800 cubic yards of sediment and an undetermined volume of recoverable oil were collected in 9 Geotubes and the water treatment system. The range of depth of sediment removed was from 1.5 to 2 feet. Generally, depth of removal increased as the cut approached the face of the dam. The project was delivered ahead of schedule and without health and safety incident.

From an environmental function, project management executed the collection and analysis of the following sets of performance management data:

1. Effluent samples at a frequency above and beyond the requirements of the NPDES permit were collected throughout the process.
2. Continuous on site and perimeter real time air monitoring, air samples, and noise readings during the periods of operation
3. Daily surface water quality analyte samples and
4. Continuous surface water quality real time measurements for such parameters as turbidity, pH and temperature.

The environmental data manager effectively managed and delivered this data from multiple sources in a timely manner for onsite project management. These sets of data were used to demonstrate best management practices during the course of the dredging activity. Please refer to the site workplan for more details concerning these data sets. The following documents the overall findings of these data sets:

1. All NPDES requirements were met during the period of operation.
2. Real time air monitoring before and during the 25 days of Ceresco dredging operations documented 2 benzene detects out of approximately 2,240 readings and 16 volatile organic compound (VOC) detection out of approximately 5,770 readings. The maximum concentration was 1 part per million (ppm) for benzene and 0.9 ppm for VOCs, respectively. The overwhelming majority of analytical samples showed no crude oil-related analytes of interest were detected. These air monitoring and sample results confirm that air quality was not adversely impacted by dredging activities. Odor complaints due to dredging operations were not reported.

3. Noise monitoring was conducted daily within the Ceresco community as well as the work area. Complaints of excessive noise due to dredging operations were not reported.
4. Surface water samples were collected daily from the following three locations, upstream of dredging operations, downstream of operations but upstream of the dam, and downstream of the dam just west of the final containment measures. VOCs and semi-VOCs concentrations were less than reporting detection limit for the samples collected. Concerning metals, relatively minor concentrations of iron, lead, zinc, and manganese were detected sporadically during the sampling program at all 3 locations. The results demonstrate that surface water quality was not adversely impacted by dredging operations.
5. Continuous measurements of turbidity, pH, dissolved oxygen, specific conductivity, and temperature collected by Eureka Environmental Manta 2 Multiprobes at downstream and upstream locations of dredging operations. Turbidity measurements were successfully used as part of the best management practices to ensure that dredging operations did not create sustained periods of downstream turbidity greater than two times upstream. Containment boom and turbidity curtains placement and maintenance successfully contained sheen and turbidity within the dredging area.

From an operational perspective, the following actions constituted the significant elements which led to the success of the project:

1. The framework of the workplan allowed for ample design, detail and flexibility to provide for an organized and effective construction of the main execution components of treatment pad, treatment system, hydraulic dredge sediment removal, sediment and oil containment measures and geobag management. The flexibility and delegation to field decision makers allowed for rapid and effective response to changing site conditions.
2. The construction manager effectively coordinated in an anticipatory mode with several layers of management to execute construction components such as drainage pad construction, water treatment system installation and multiple dredge use ahead of construction schedule.
3. Excellence in trades and health & safety operations was maintained thru rigorous multiple layer coordination, onsite safety officer excellence and the awareness of onsite workers.
4. Innovative solutions were executed to overcome obstacles:
 - a. Debris location in the dredge zones ahead of dredger using techniques such as pre-poling and metals detecting instrumentation.
 - b. Innovative use of multiple sediment curtain layers of varying types and uses such as carbon impregnated layered material and attaching boom to the moving dredge in a containment pattern

- c. Maintaining rapid access and deployment for critical dredge components that allowed for efficient repairs typical of dredge projects with significantly reduced down time.
- d. Use and efficient execution of the shallow water, high solids Amphibex dredger
- e. Rapid mobilization of 2 additional dredges and successful simultaneous execution of 3 dredgers which was necessary to meet the expanded scope and provide overall project savings by reducing the original schedule timeline by approximately a week.

On October 19, 2010, priority site MP 5.75 South was recommended for final sign-off.

Outcome

The site was visited by USEPA and Enbridge representatives on October 23, 2010. Site MP 5.75 South was cleared and received final sign-off.

Attachment Descriptions

The ensuing information listed below directly follows in this Submerged Oil Recovery Summary Report:

- USEPA and Enbridge signed Submerged Oil Remediation Status Tracking Form.
 - Contains signatory approvals.
- Site Summary
 - Provides information used by the field teams to better understand site specific characteristics of the priority locations and determined the most appropriate recovery technology. Information included site layout, areal extent, depth to water, sediment thickness, sediment bed type, data collected, habitat description and habitat quality, containment measures, access, and recommendations.
- Pre- and Post- Submerged Oil Recovery Figures
 - Presents qualitative pre- and post- poling data in a graphical format.
- Pre-Dredge and Post-Dredge Bathymetry Maps
 - Presents qualitative pre-dredge and post-dredge elevations and comparisons
- Photographs
 - Provides visual documentation of pre- and post- submerge oil recovery activities.

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 10-18-2010

EPA(REP): John Verlac

ENBRIDGE(REP): Mike Smiley /Robert Suehs Dan Sullivan TetraTech (dredging)

LOCATION
(Division/Sect/MP) **MP 5.75 S Ceresco Dam**

site recommended for dredging (9/21) after 2 days of aeration treatment

CLEANUP METHODS USED

Method: aeration Notes: 4 cells all cells aerated X 2-3 times each, but still red

Method: Dredging Notes: Site fully dredged

Method: Notes:

OIL COLLECTION METHODS USED

Method: sorbent boom

Method:

DISCERNABLE OIL
OBSERVED (end of day) No, site fully dredged

Sheen(heavy, medium, light) no

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): **Yes**

Team Lead: Mike Blevin

Remediation Complete
SITE APPROVAL

Name

Signature

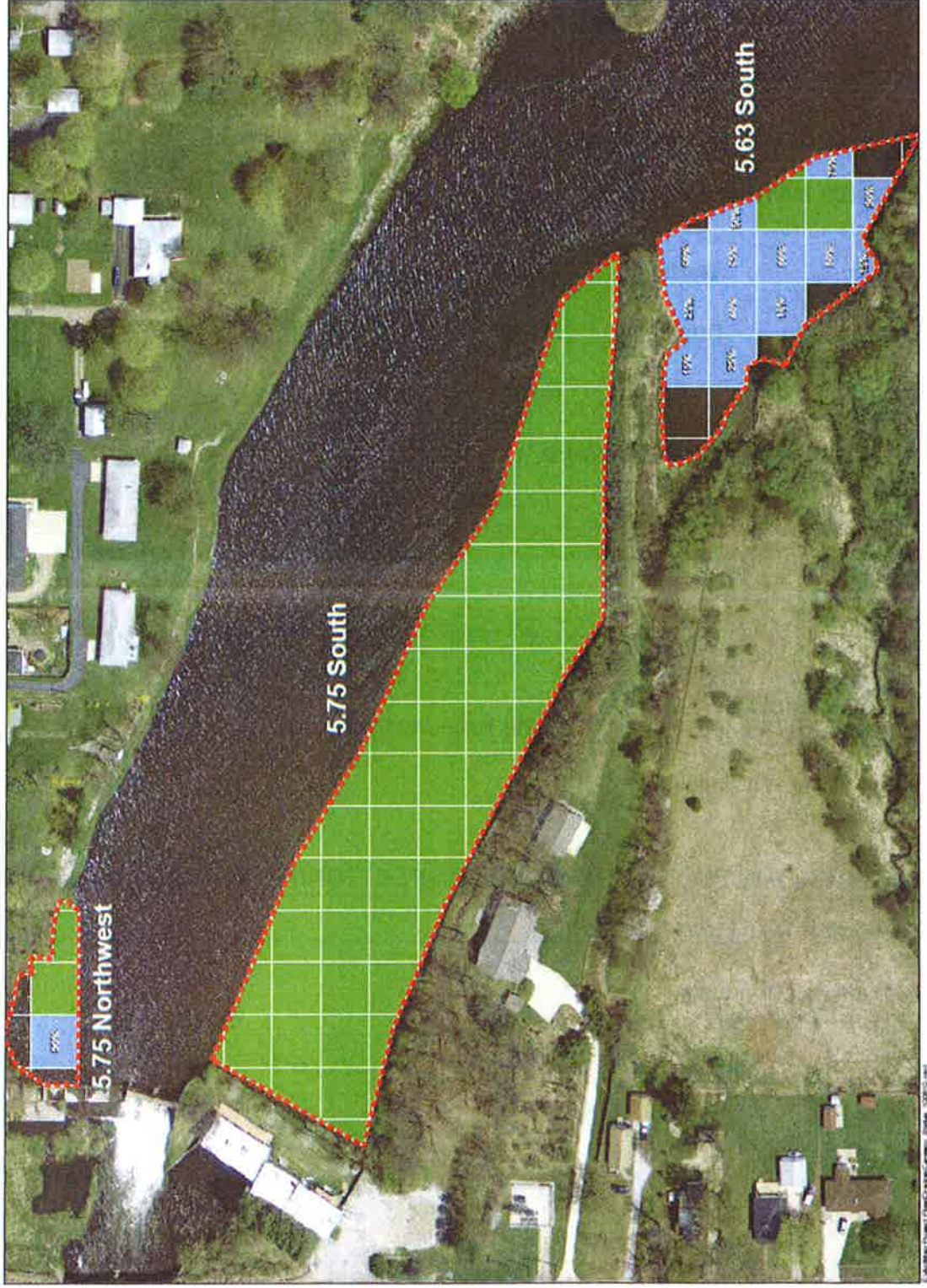
Date

EPA: LEO FRANCELDESE

Enbridge: Joe Kackas

[Signature] 10/23/10
[Signature] 10/23/10

Daily Progress Tracking Ceresco Dam Dredging



Legend

- Priority Areas
- Dredging Cell
- Dredging Complete
- Dredging In-Progress

Dredging Complete Through 10/17/10:
 5.75 Northwest: 44%
 5.75 South: 100%
 5.63 South: 13%

Treated Water Discharge:
 934,000 Gallons on 10/18/10



0 50 Feet
 1 Inch = 50 Feet

Coordinate System: Michigan State Plane South
 National Datum (NAD83)
 Unit: International Feet

DREDGING PROGRESS MAP
CERESCO DAM
SUBMERGED OIL TASK FORCE
CERESCO, MICHIGAN
 October 18, 2010

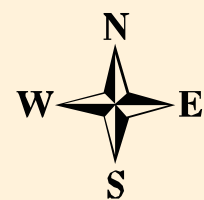
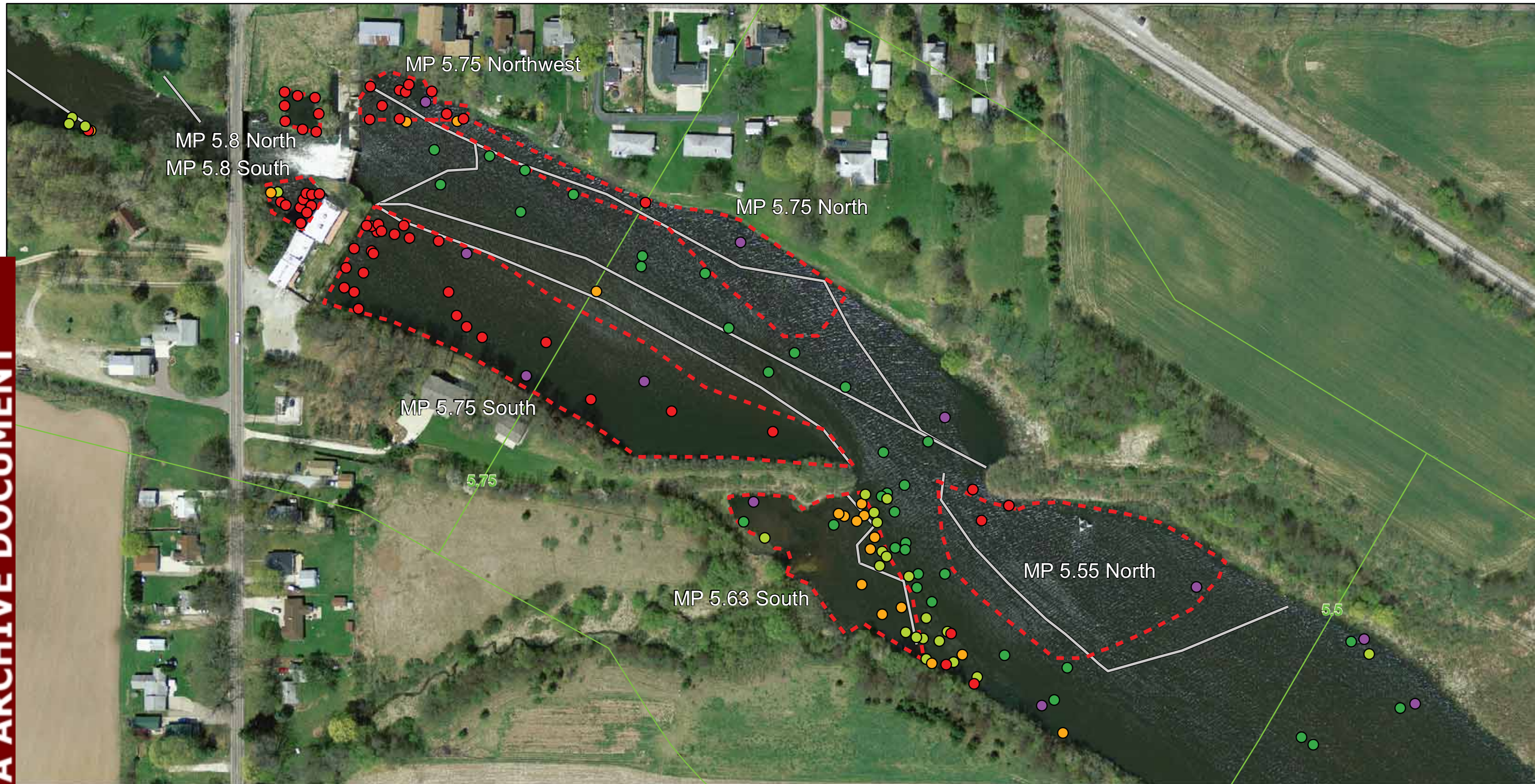


10/18/10 - C. Cooper

SITE SUMMARY – 5.75 CERESCO DAM SOUTH

The information provided below shall be used by the field teams to better understand site specific characteristics of the priority locations and determine the most appropriate recovery technology.

Site Location:	MP 5.75 Ceresco Dam South
Site Layout:	See Figure Attached
Description and Geomorphic Setting:	Upstream of Dam
Approximate Areal Extent:	~2.5 acres
Approximate Depth of Water:	0 to 1 foot
Sediment thickness:	4+ feet
Bed type:	Soft sediment
Data Collected:	
Poling (Y/N)	Y
Cores (Y/N)	Y
Lab analysis (Y/N)	Y
Community Description and Habitat Quality:	Not provided in Ecological Assessment Reports
Containment:	1000' silt curtain, 6' skirt
Access Issues:	None
Miscellaneous:	N/A
Recommendations:	ECO: Not provided in Ecological Assessment Reports SOTF: Hydraulic Dredging



0 150 300
1 inch = 150 feet

Legend

Pre Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy
- Observed But Quantity Not Noted



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

Poling Data Collected Through:
October 18, 2010

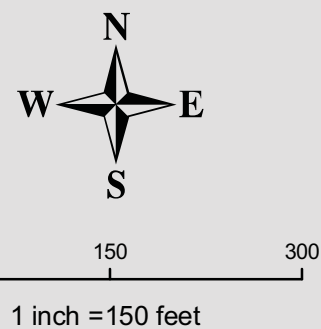
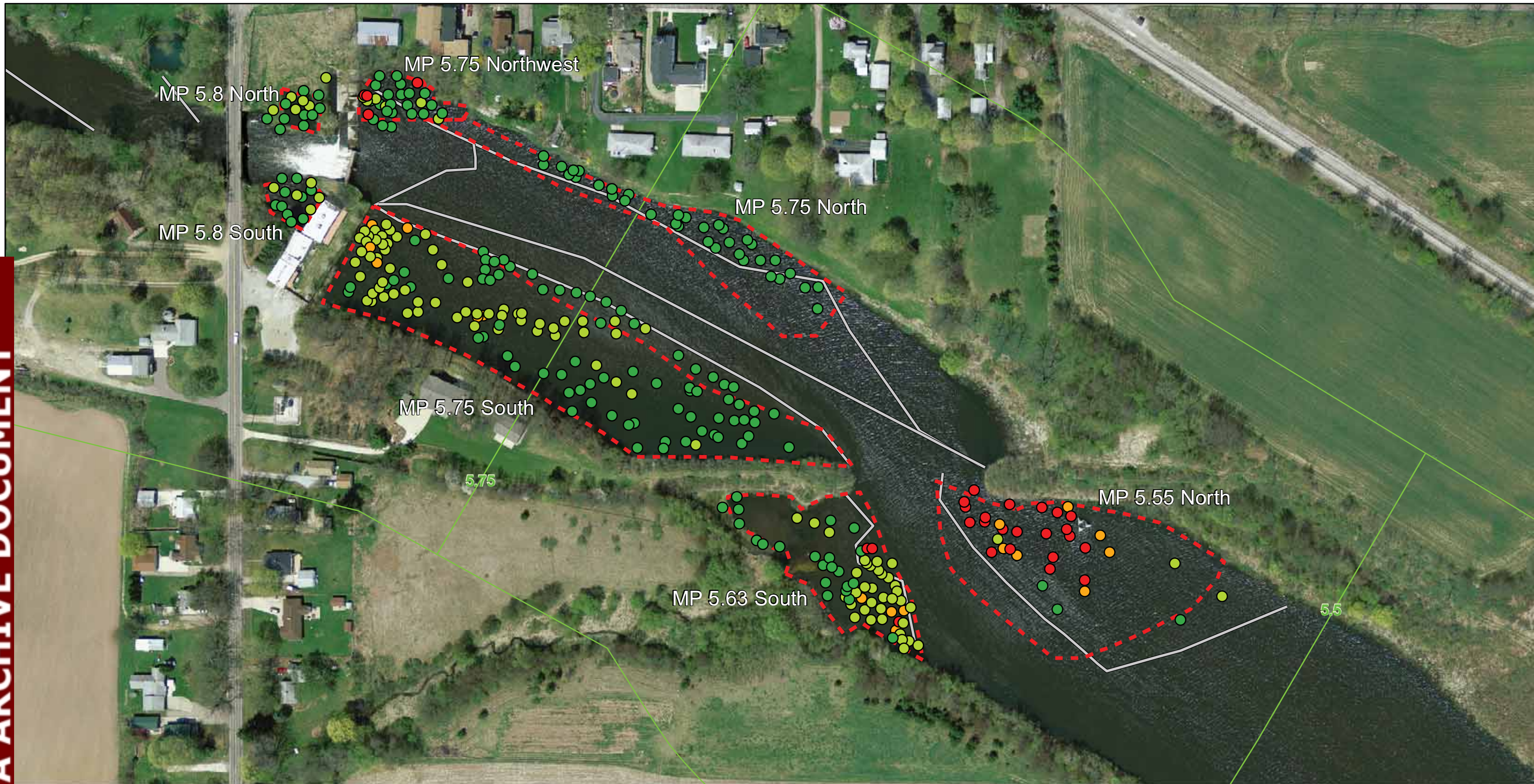
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Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA PRE RECOVERY
QUALITATIVE RESULTS**
**MP 5.55 N, MP 5.63 S, MP 5.75 N, MP 5.75 S,
MP 5.75 NW, MP 5.8 N, and MP 5.8 S**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 25, 2010





Legend

Post Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

**Poling Data Collected Through:
October 24, 2010**

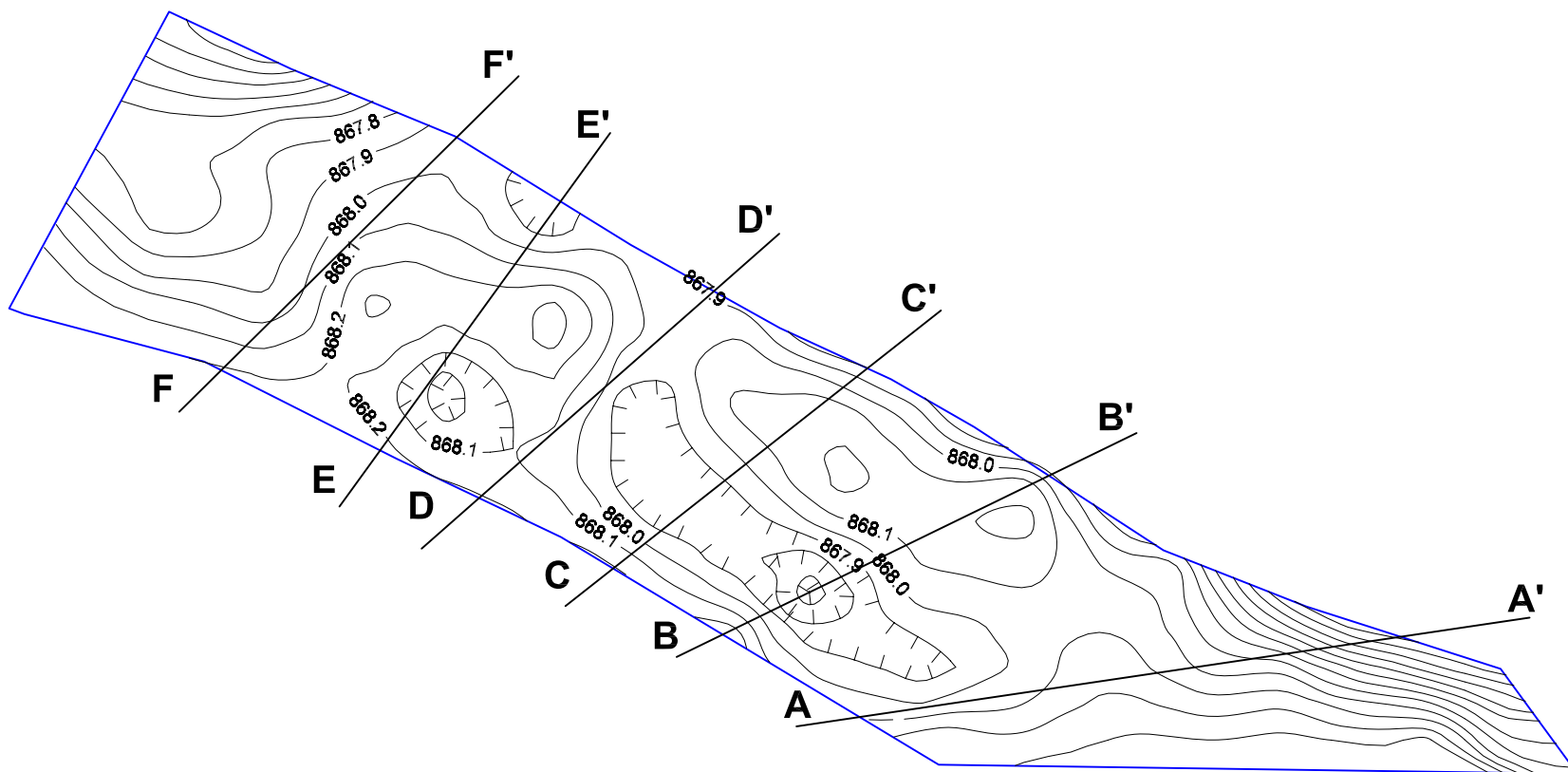
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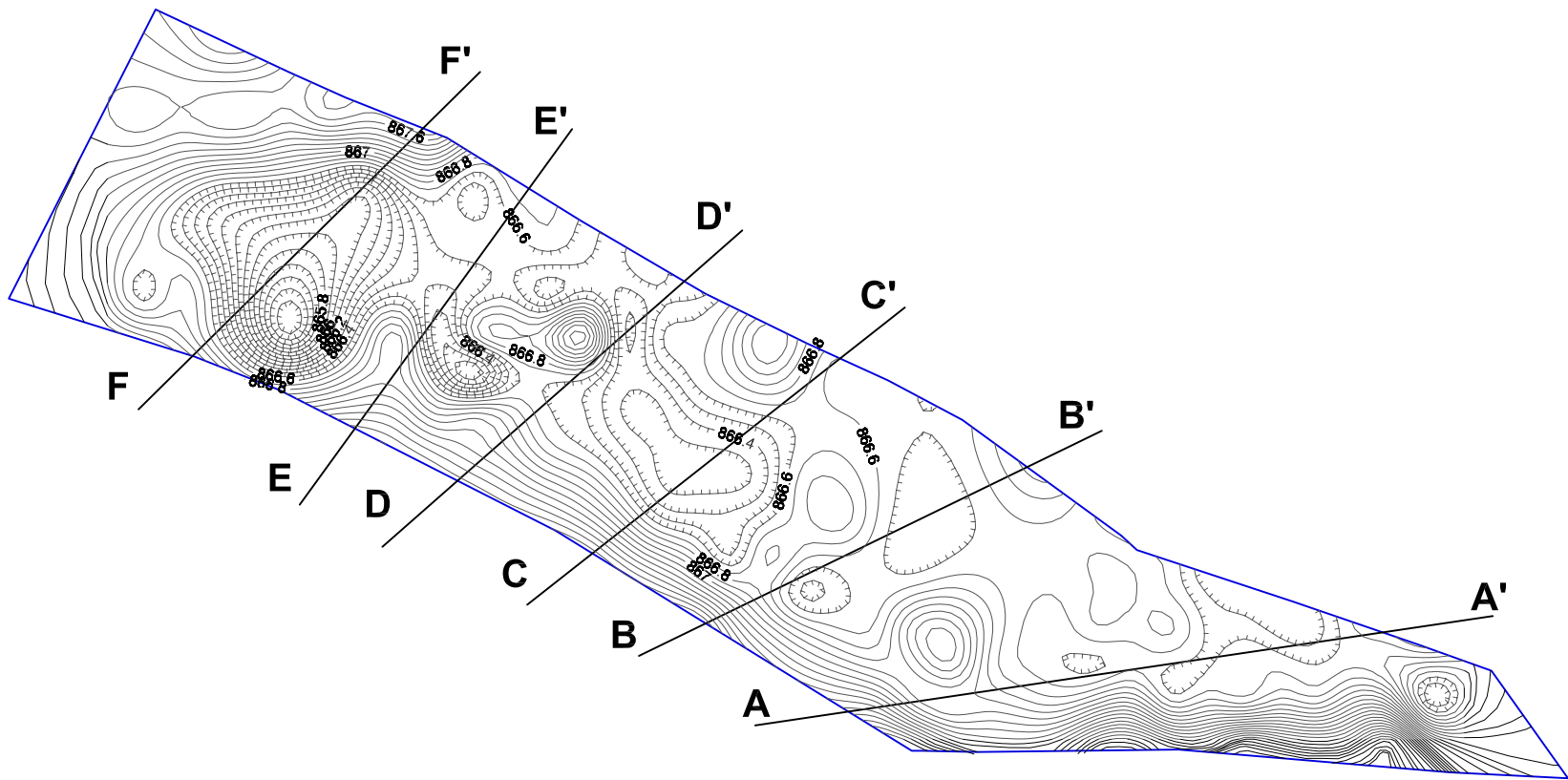
**PRIORITY AREA POST RECOVERY
QUALITATIVE RESULTS**
MP 5.55 N, MP 5.63 S, MP 5.75 N, MP 5.75 S,
MP 5.75 NW, MP 5.8 N, and MP 5.8 S

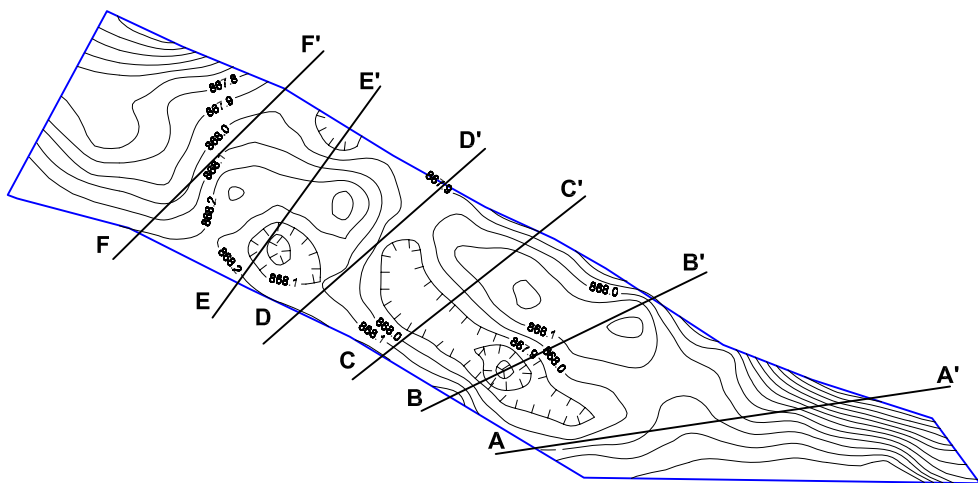
SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 26, 2010

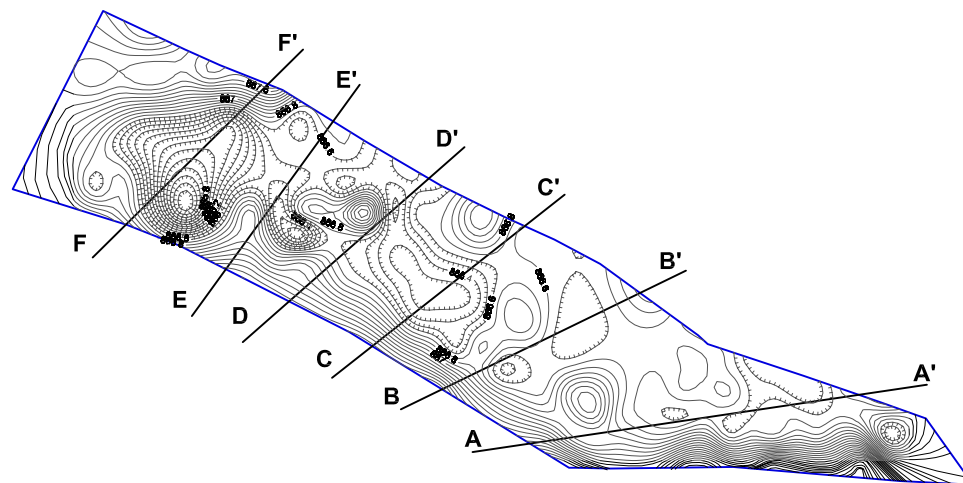




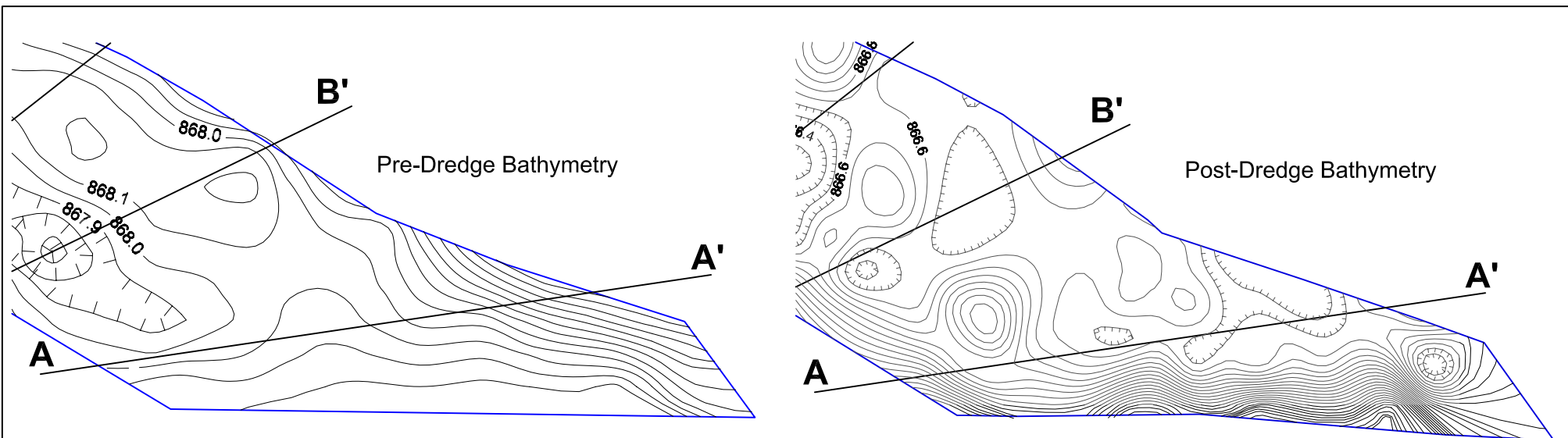




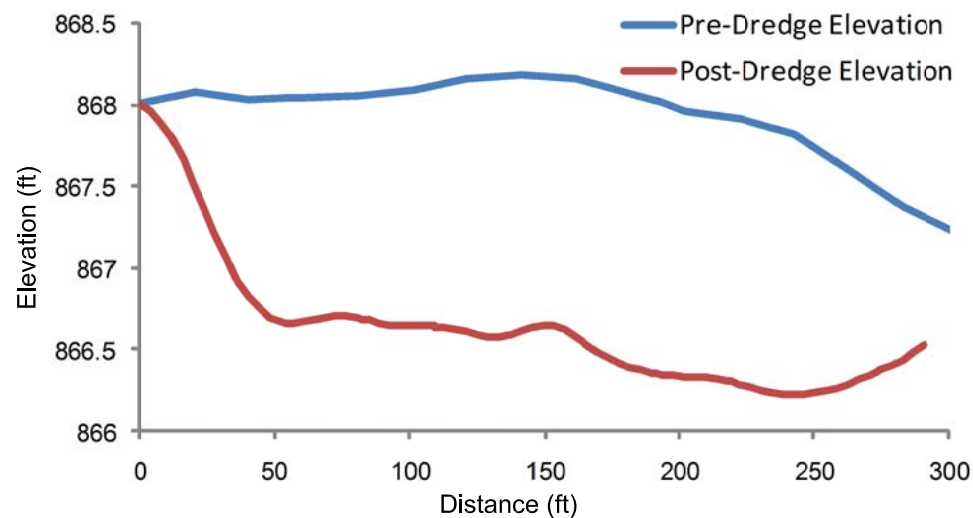
Pre-Dredge Bathymetry

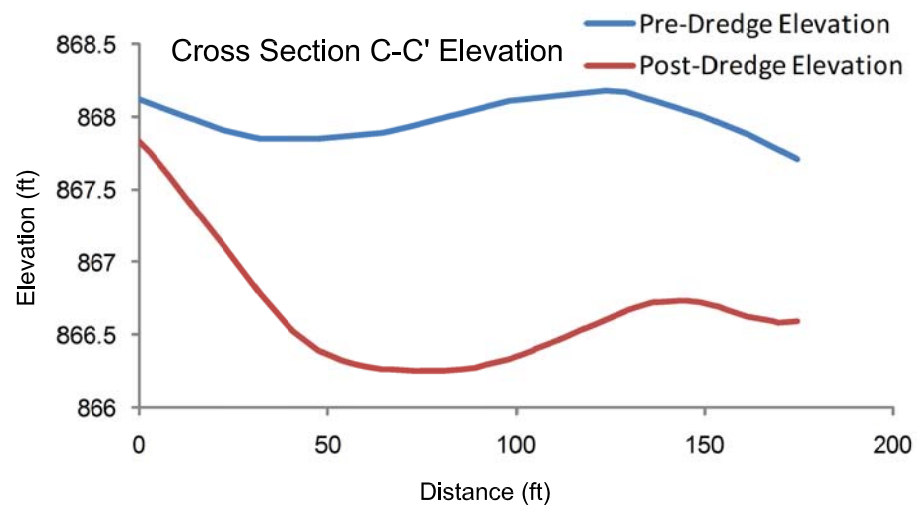
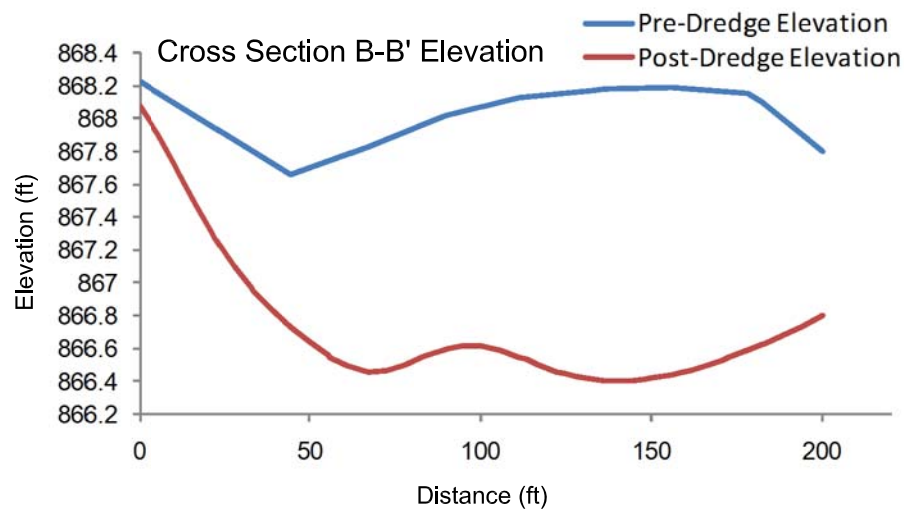
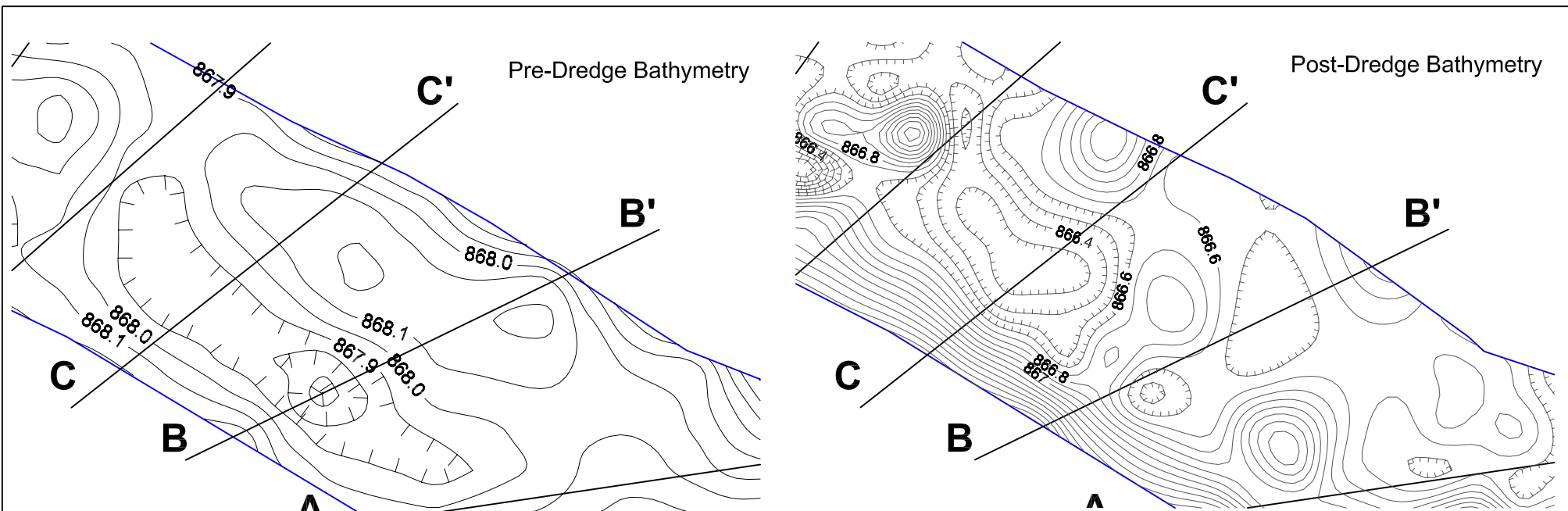


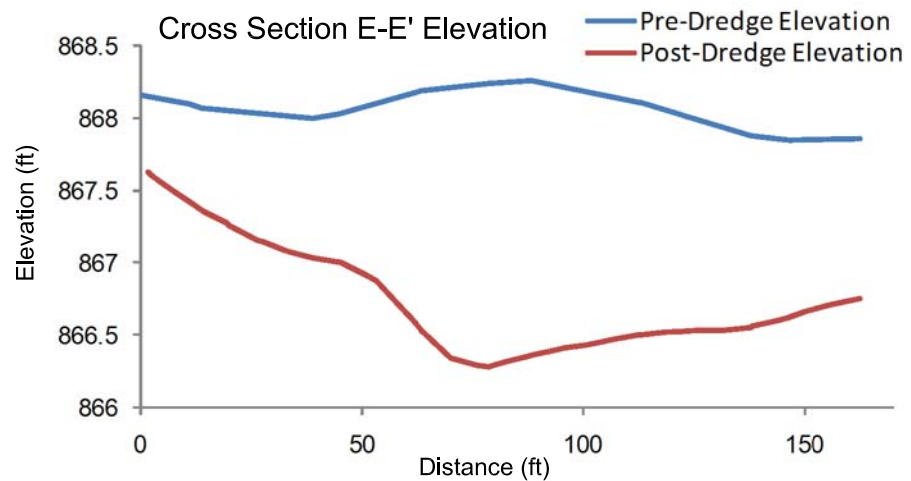
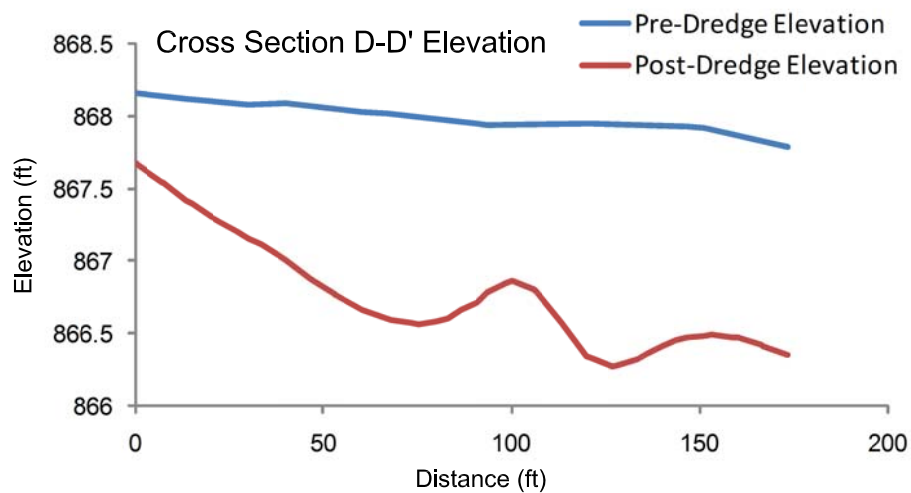
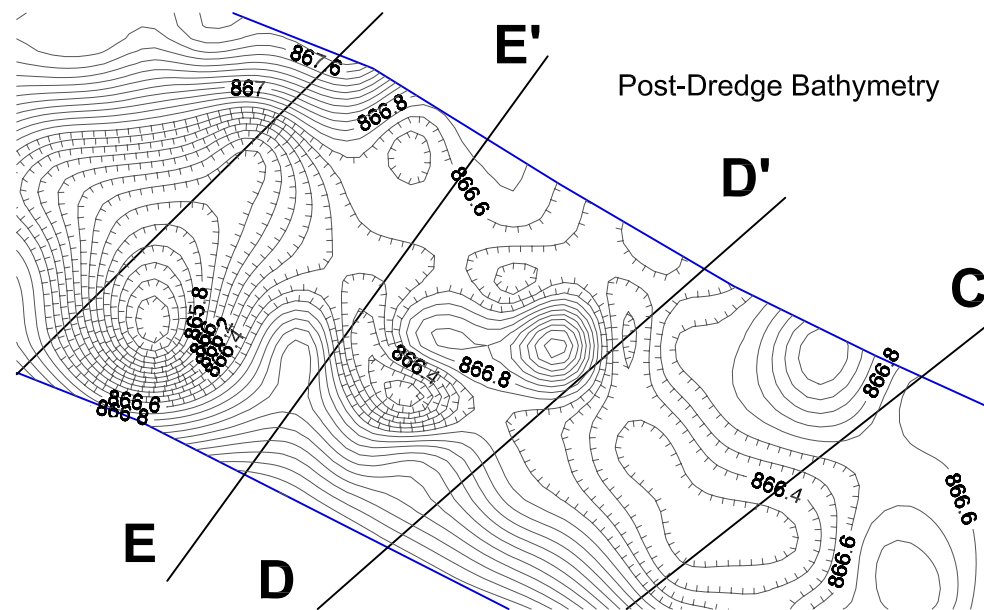
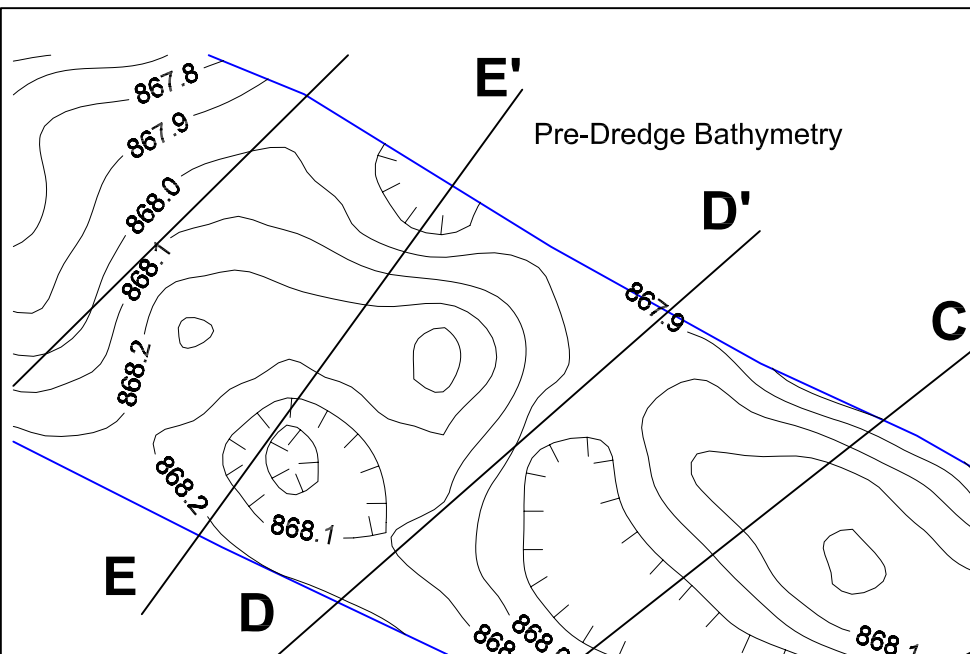
Post-Dredge Bathymetry

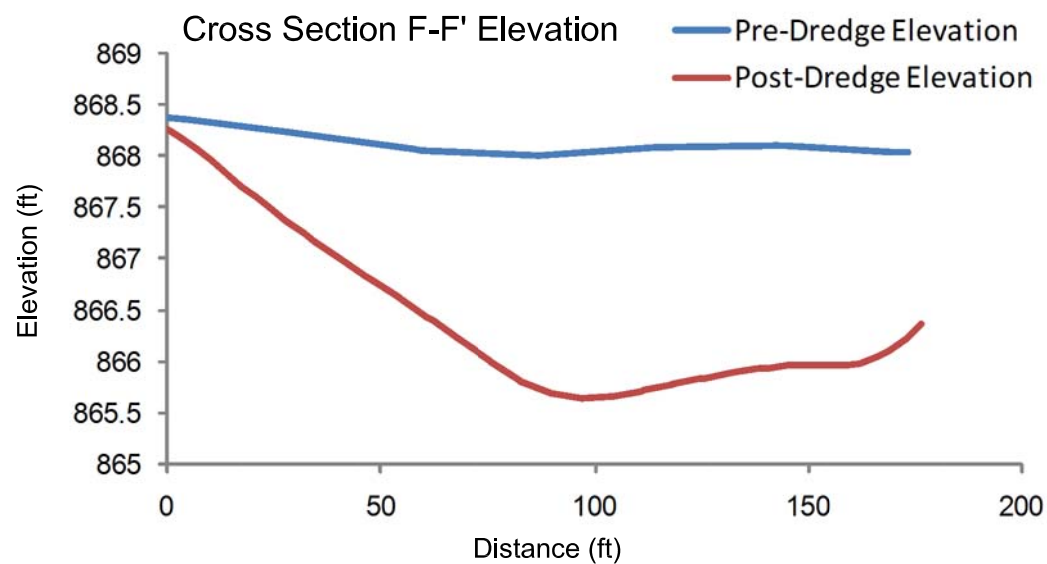
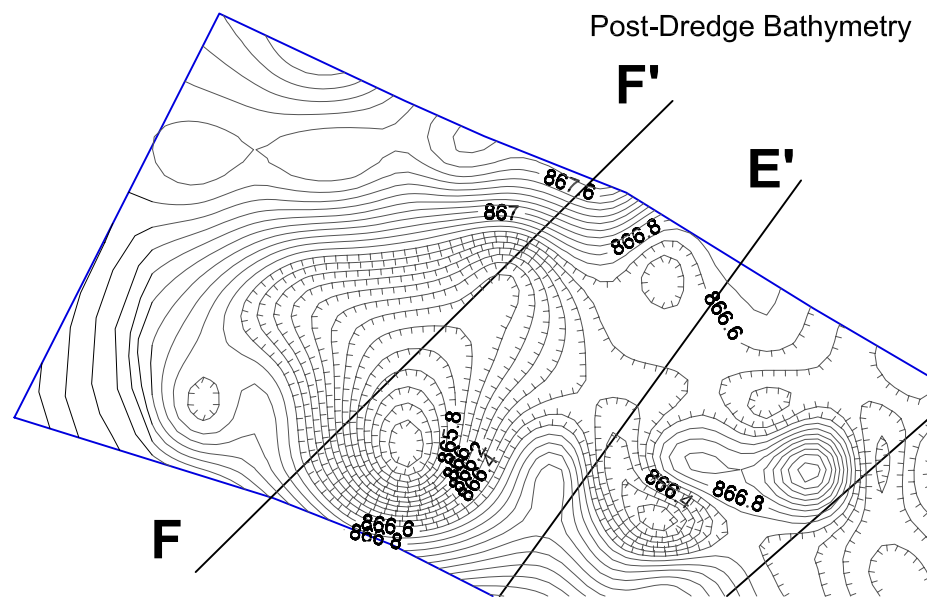


Cross Section A-A' Elevation









Ceresco Dam - 5.75 S
Submerged Oil Task Force
Calahoun County, MI
October 27, 2010



Countours Created on Surfer using the Kriging Meathod
Scale 1" = 75'
Created by: L. Hejnal

PHOTOGRAPH LOG

Photograph 1

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.75 South

Date:
10/14/10

Description:
Recovery activities in
progress – Dredging with
Amphibex

View Direction:
Facing northeast



PHOTOGRAPH LOG

Photograph 2

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.75 South

Date:
10/18/10

Description:
Recovery activities in
progress – Dredging with
Amphibex

View Direction:
Facing east



PHOTOGRAPH LOG

Photograph 3

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.75 South

Date:
10/17/10

Description:
Recovery activities in progress – Dredging with Amphibex

View Direction:
Facing southeast



PHOTOGRAPH LOG

Photograph 4

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.75 South

Date:
10/18/10

Description:
Recovery activities in progress – Dredging with Amphibex

View Direction:
Facing east



PHOTOGRAPH LOG
Photograph 5

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.75 South

Date:
10/24/10

Description:
Recovery activities
complete – dredging
completed

View Direction:
Facing west

**PHOTOGRAPH LOG**
Photograph 6

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.75 South

Date:
10/24/10

Description:
Recovery activities
complete – dredging
completed

View Direction:
Facing south



PHOTOGRAPH LOG
Photograph 7

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.75 South

Date:
10/24/10

Description:
Recovery activities
complete – dredging
completed

View Direction:
Facing west

**PHOTOGRAPH LOG**
Photograph 8

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.75 South

Date:
10/24/10

Description:
Recovery activities
complete – dredging
completed

View Direction:
Facing west



**Enbridge Line 6B MP 608 Pipeline Release
Marshall, Michigan**

**Permanent Recovery of Submerged Oil and Oil-Contaminated
Sediments at Priority Locations**

**Submerged Oil Recovery Summary Report
Kalamazoo River MP 5.8 North
(Downstream Pool Adjacent to Ceresco Dam)**

Enbridge Energy

EXECUTIVE SUMMARY

A Submerged Oil Task Force (SOTF) was created on Tuesday, August 24, 2010, to perform field assessment, characterization, and mapping of submerged oil impacts in surface water and sediments of Talmadge Creek, Kalamazoo River and Morrow Lake (Talmadge Creek to Kalamazoo River to River Mile Post [RMP] 40). The SOTF is comprised of representatives from the United States Environmental Protection Agency (USEPA), the Michigan Department of Natural Resources and the Environment (MDNRE), Stakeholders, Enbridge and their contractors.

As a result of the initial field assessments, 34 sites in the Kalamazoo River had been identified as potentially containing accumulations of significant amounts of submerged oil in river sediments. These areas were further investigated, and 18 were identified as high priority areas and were recommended for submerged oil recovery by the SOTF. These 18 priority areas were also subjected to an ecological habitat assessment intended to classify their ecological use and value to help guide cleanup operations. The SOTF discussed the assessment in conjunction with possible cleanup approaches, and in a September 21, 2010 memorandum the Task Force Leaders provided recommendations for oil removal for these 18 priority areas.

Initial Assessment

The Qualitative Assessment was a reconnaissance effort to identify areas with the presence of submerged oil, identify depositional areas, prioritize sites based on a relative comparison of impacted sites, and obtain information on the depositional and erosional characteristics of geomorphic settings in which the impacted sites were identified. This was accomplished by in-channel sediment poling, which consisted of inserting a graduated metal pole equipped with a foot disk, into the sediment and recording visual evidence of oil, sheen (light, moderate, or heavy), droplets, globules, and/or tar balls after the sediment was agitated. Each poling location was located by GPS, with the elevation of the water surface, depth of water, top of sediment, and depth of soft sediment recorded. The primary criterion for prioritizing sites for quantitative sampling was the visual presence of oil in the qualitative phase. These areas were identified by the Tetra Tech field scientists. Depositional areas of the river were mapped and targeted for sampling during the quantitative sampling program.

RMP 5.8 North - (Downstream Pool Adjacent to Ceresco Dam)

MP 5.8 North was a newly identified location for permanent oil recovery. It is a small downstream pool on the north side of the river at the base of Ceresco Dam. The north pool is located north of the dam's main channel spillway. The approximate areal extent of this small pool is 0.07-acres.

Actions

Due to its small areal extent MP 5.8 North was considered 1 cell for oil recovery purposes. Oil recovery activities ran through October 14, 2010. The cell was aerated with combination of water flushing, and physical draining, followed by pressure washing of the concrete areas. Oil was collected by vacuum truck, absorbent boom and pads. On October 14, 2010, priority site MP 5.8 North was recommended for final sign-off. In addition, Enbridge reworked the shoreline at this location, changing the overall shape to a more natural configuration and also added a rip-rap protective shoreline.

Outcome

Site MP 5.8 North was visited by USEPA and Enbridge representatives on October 15, 2010. The USEPA and Enbridge representatives entered the site by walking along the bank; no discernable oil was present. Site MP 5.8 North was cleared and received final sign-off.

Attachment Descriptions

The ensuing information listed below directly follows in this Submerged Oil Recovery Summary Report:

- USEPA and Enbridge signed Submerged Oil Remediation Status Tracking Form.
 - Contains signatory approvals.
- Site Summary
 - Provides information used by the field teams to better understand site specific characteristics of the priority locations and determined the most appropriate recovery technology. Information included site layout, areal extent, depth to water, sediment thickness, sediment bed type, data collected, habitat description and habitat quality, containment measures, access, and recommendations.
- Pre- and Post- Submerged Oil Recovery Figures
 - Presents qualitative pre- and post- poling data in a graphical format.
- Photographs
 - Provides visual documentation of pre- and post- submerge oil recovery activities.

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 10-14-10

EPA(REP): Karen Berecz

ENBRIDGE(REP): John Maffeo/Wade Gannaway

LOCATION
(Division/Sect/MP)

MP 5.80N

CLEANUP METHODS USED

Method: Water flush Notes: Water flushed cell1, water washed bottom sediment

Method: Draining Notes: Drained the pond areas,

Method: Power washing Notes: Concrete areas

OIL COLLECTION METHODS USED

Method: vac truck, sorbent pads, snare

Method: frac tanks

DISCERNABLE OIL
OBSERVED (end of day)

NO

Sheen(heavy, medium, **light**) Light sheen Globules No

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): YES

Team Lead: Wade Gannaway

Comments:

Remediation Complete

SITE APPROVAL

Name

Signature

Date

EPA:

Paul R. Penonard

[Signature]

10/15/2010

Enbridge:

Joe Kackos

[Signature]

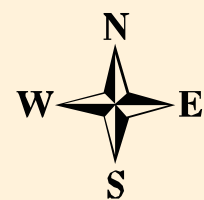
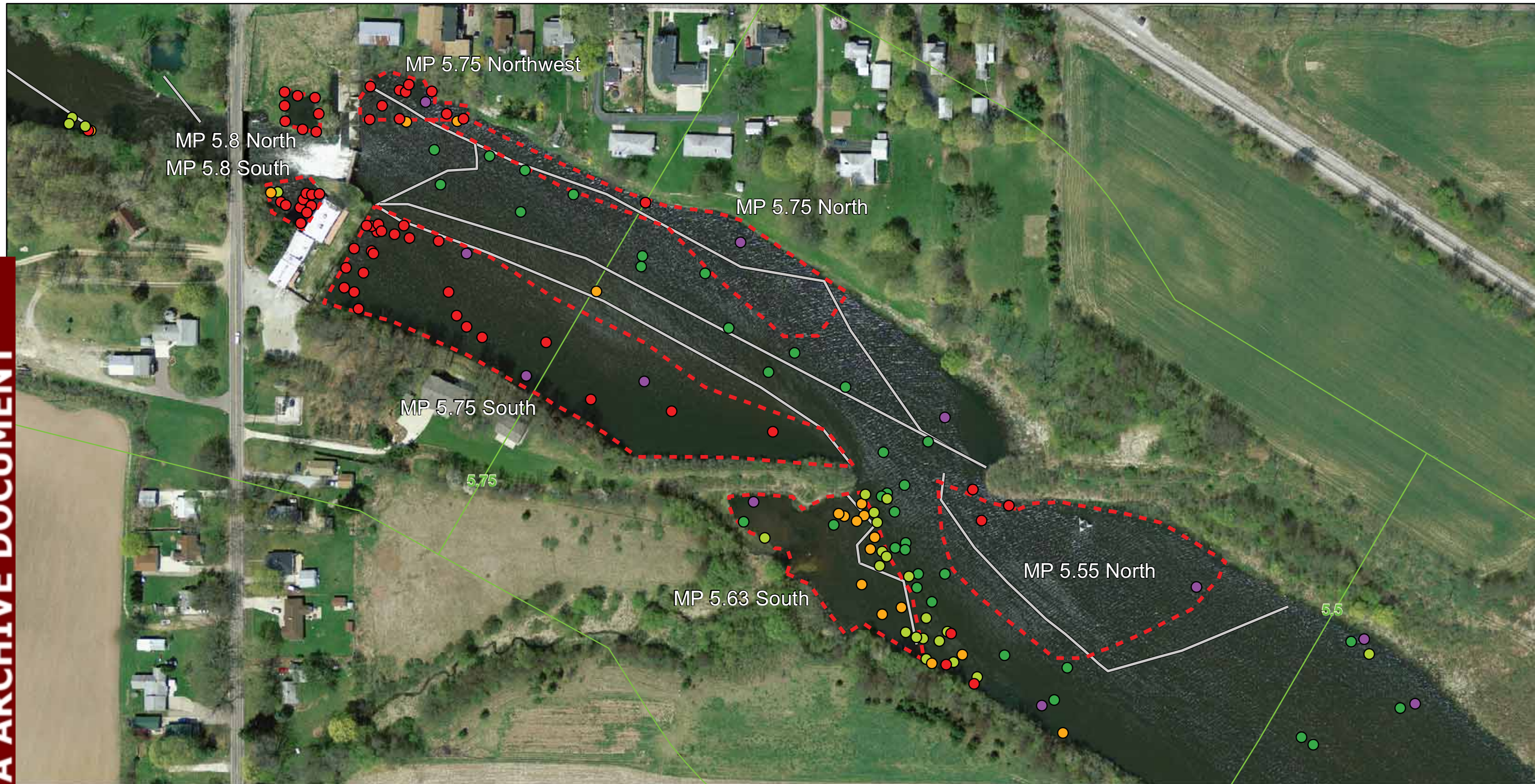
10/15/2010

SITE SUMMARY – 5.8 DOWNSTREAM OF CERESCO DAM NORTH SIDE

The information provided below shall be used by the field teams to better understand site specific characteristics of the priority locations and determine the most appropriate recovery technology.

Site Location:	MP 5.8 Downstream of Ceresco Dam North Side
Site Layout:	See Figure Attached
Description and Geomorphic Setting:	Downstream of Dam, North Side
Approximate Areal Extent:	~0.07 acres
Approximate Depth of Water:	0 to 2 foot
Sediment thickness:	1+ feet
Bed type:	Soft sediment over sand, gravel, rock
Data Collected:	
Poling (Y/N)	Y
Cores (Y/N)	Y
Lab analysis (Y/N)	Y
Community Description and Habitat Quality:	Not provided in Ecological Assessment Reports
Access Issues:	Accessible by shore and water
Miscellaneous:	N/A
Recommendations:	<p>ECO: Aquatic: Low energy, eddy like environment consisting of riverine water aquatic bed with no submergent aquatic vegetation visible.</p> <p>Wetland: Riparian habitat consists of un-vegetated shore along river with cobbles and gravel over coarse sand. Some oil staining of cobbles and sheening present along shore. Riparian vegetation on bank dominated by <i>Rosa multiflora</i>, <i>Fraxinus pennsylvanica</i> and <i>Picea sp.</i></p> <p>Adjacent: Adjacent property consists of fragmented transitional palustrine forested habitat dominated by <i>Rosa multiflora</i> and <i>Fraxinus pennsylvanica</i>.</p> <p>Wildlife: Open water area and eddy environment provides low energy environment for fish and waterfowl resting area. Low energy environment provides for fish resting and staging area.</p> <p>SOTF: Extensive restoration already undertaken upstream of Ceresco Dam, including hydraulic dredging. Recommend that reasonably aggressive steps be taken to remove the submerged oil. The technique employed would rely primarily on aeration, but may also include sediment skimming, flushing, raking or a combination of these. In addition, scraping with long stick excavators is feasible off the adjacent upland bank.</p>
Recovery Techniques:	The Submerged Oil Task Force has attempted to use aeration, raking, and flushing in accordance with the <i>Standard Operating Procedure for Submerged Oil Recovery</i> at two small “ponding areas” located on the right descending bank at MP 5.8 below Ceresco Dam. These areas are small pools of stagnant river water, isolated from the main river due to low water levels. The EPA and Enbridge have observed ongoing operations at these

locations using the approved recovery methods and have determined that an alternate recovery strategy of draining the water from the pools and directly removing the oil contaminated soils/sediments will be more effective and efficient. Prior to draining the pools, the areas will be quarantined and isolated so that no water can flow into or out of the pools. Operations will then use vac trucks to collect the water in the pools. The removed water will be disposed of at frac tank city. Once the pools are empty, EPA and Enbridge will evaluate the extent of oiling of the bottom sediment and the overall condition of the bottom's substrate. Based on this evaluation, EPA and Enbridge will decide what removal/remediation techniques should be utilized. Possible options will include scraping, manual removal, and flushing of the contaminated sediments. These operational strategies are subject to change based on decisions made by the Submerged Oil Task Force and the EPA. Oil recovery operations will follow procedures in the Standard Operating Procedure for Submerged Oil Recovery and the Work Plan for Permanent Recovery of Submerged Oil and Oil-Contaminated Sediments. The site safety plan will be drafted before work will begin and will identify the specific safety equipment required for that work site. Although the areas have been assessed as low ecological sensitivity areas, all workers will be reminded to minimize their impact on the surrounding environment.



0 150 300
1 inch = 150 feet

Legend

Pre Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy
- Observed But Quantity Not Noted



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

Poling Data Collected Through:
October 18, 2010

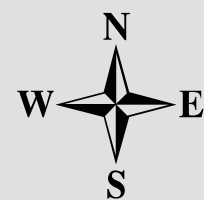
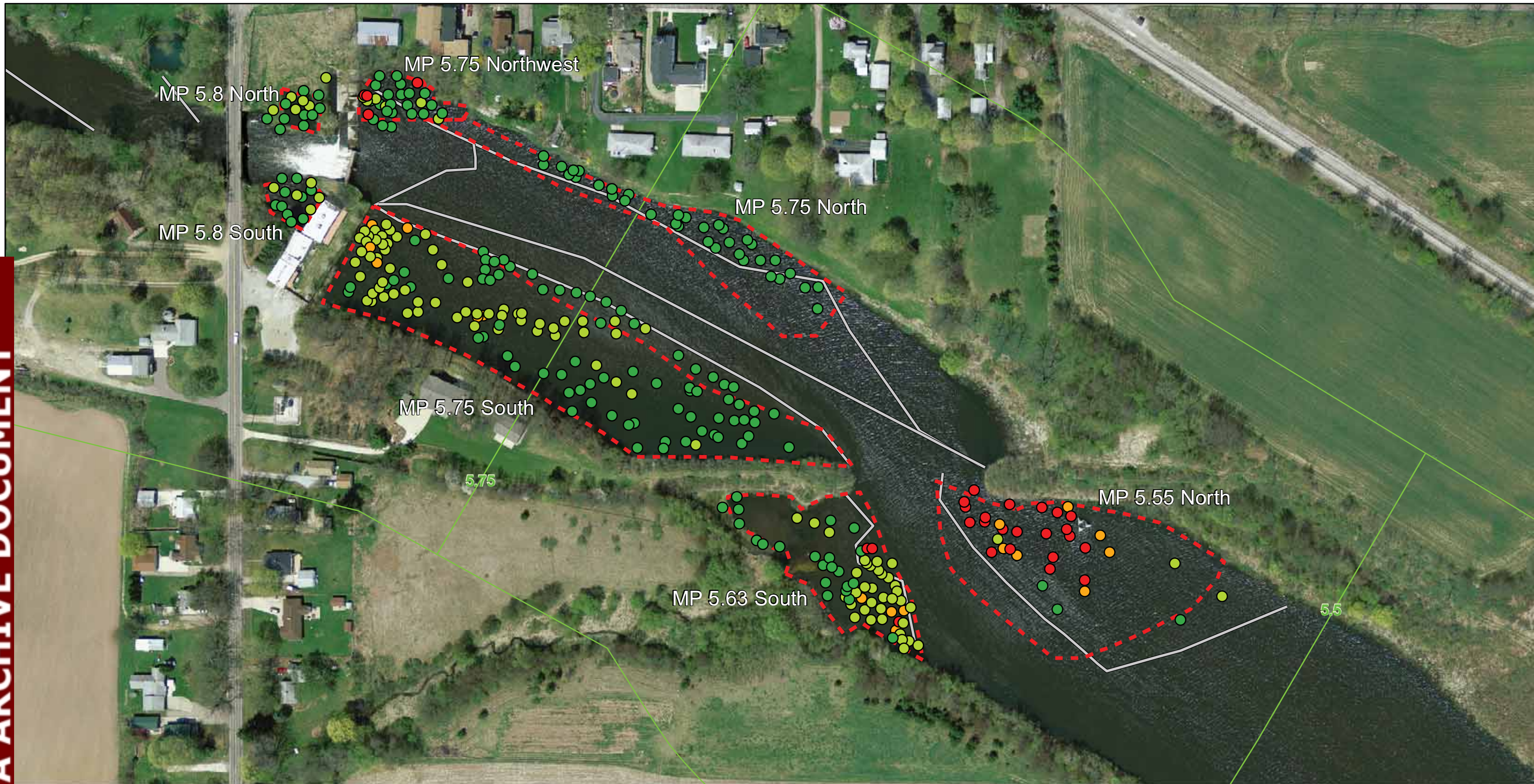
Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA PRE RECOVERY
QUALITATIVE RESULTS**
MP 5.55 N, MP 5.63 S, MP 5.75 N, MP 5.75 S,
MP 5.75 NW, MP 5.8 N, and MP 5.8 S

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 25, 2010





0 150 300

1 inch = 150 feet

Legend

Post Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

**Poling Data Collected Through:
October 24, 2010**

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA POST RECOVERY
QUALITATIVE RESULTS**
MP 5.55 N, MP 5.63 S, MP 5.75 N, MP 5.75 S,
MP 5.75 NW, MP 5.8 N, and MP 5.8 S

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 26, 2010



TETRA TECH EC, INC.

PHOTOGRAPH LOG

Photograph 1

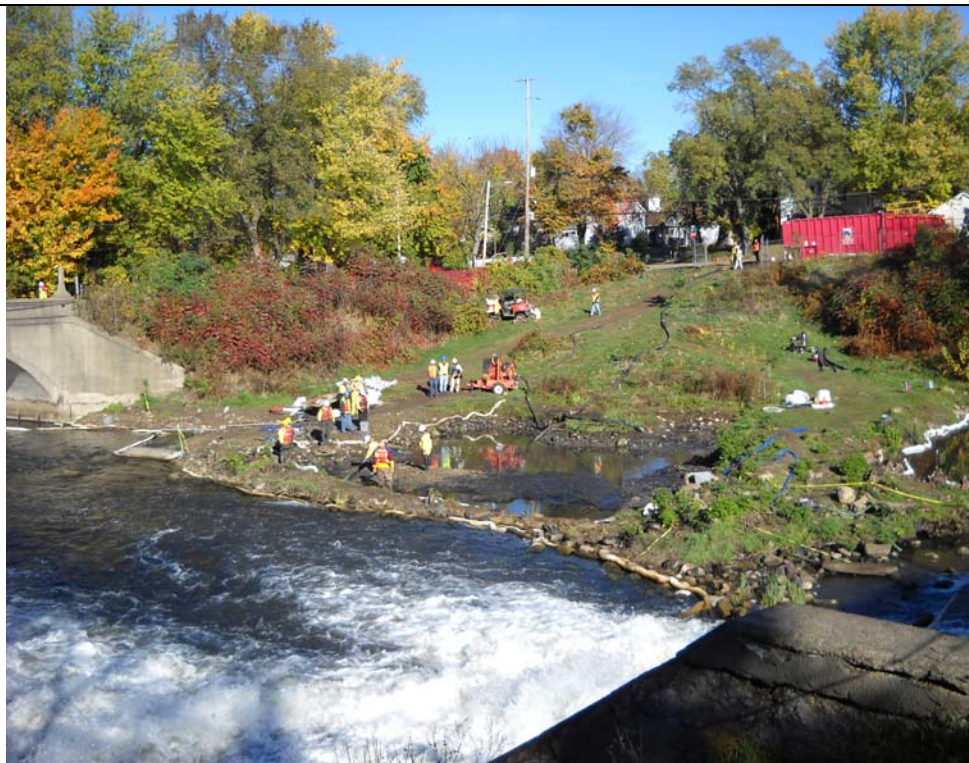
Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.8 North

Date:
10/14/10

Description:
Recovery activities in progress – pumping down water area

View Direction:
Facing northeast



PHOTOGRAPH LOG

Photograph 2

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.8 North

Date:
10/14/10

Description:
Recovery activities in progress – pumping down water area

View Direction:
Facing west



PHOTOGRAPH LOG

Photograph 3

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.8 North

Date:
10/14/10

Description:
Recovery activities in progress – pumping and water washing

View Direction:
Facing west



PHOTOGRAPH LOG

Photograph 4

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.8 North

Date:
10/14/10

Description:
Recovery activities in progress – boom and pad deployment and power washing

View Direction:
Facing east



PHOTOGRAPH LOG

Photograph 5

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.8 North

Date:
10/24/10

Description:
Post Recovery Activities in progress – grading side of bank after sediment removal

View Direction:
Facing north



TETRA TECH EC, INC.

PHOTOGRAPH LOG

Photograph 6

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.8 North

Date:
10/24/10

Description:
Post Recovery activities complete – site restored

View Direction:
Facing north



**Enbridge Line 6B MP 608 Pipeline Release
Marshall, Michigan**

**Permanent Recovery of Submerged Oil and Oil-Contaminated
Sediments at Priority Locations**

**Submerged Oil Recovery Summary Report
Kalamazoo River MP 5.8 South
(Downstream Pool Adjacent to Ceresco Dam)**

Enbridge Energy

EXECUTIVE SUMMARY

A Submerged Oil Task Force (SOTF) was created on Tuesday, August 24, 2010, to perform field assessment, characterization, and mapping of submerged oil impacts in surface water and sediments of Talmadge Creek, Kalamazoo River and Morrow Lake (Talmadge Creek to Kalamazoo River to River Mile Post [RMP] 40). The SOTF is comprised of representatives from the United States Environmental Protection Agency (USEPA), the Michigan Department of Natural Resources and the Environment (MDNRE), Stakeholders, Enbridge and their contractors.

As a result of the initial field assessments, 34 sites in the Kalamazoo River had been identified as potentially containing accumulations of significant amounts of submerged oil in river sediments. These areas were further investigated, and 18 were identified as high priority areas and were recommended for submerged oil recovery by the SOTF. These 18 priority areas were also subjected to an ecological habitat assessment intended to classify their ecological use and value to help guide cleanup operations. The SOTF discussed the assessment in conjunction with possible cleanup approaches, and in a September 21, 2010 memorandum the Task Force Leaders provided recommendations for oil removal for these 18 priority areas.

Initial Assessment

The Qualitative Assessment was a reconnaissance effort to identify areas with the presence of submerged oil, identify depositional areas, prioritize sites based on a relative comparison of impacted sites, and obtain information on the depositional and erosional characteristics of geomorphic settings in which the impacted sites were identified. This was accomplished by in-channel sediment poling, which consisted of inserting a graduated metal pole equipped with a foot disk, into the sediment and recording visual evidence of oil, sheen (light, moderate, or heavy), droplets, globules, and/or tar balls after the sediment was agitated. Each poling location was located by GPS, with the elevation of the water surface, depth of water, top of sediment, and depth of soft sediment recorded. The primary criterion for prioritizing sites for quantitative sampling was the visual presence of oil in the qualitative phase. These areas were identified by the Tetra Tech field scientists. Depositional areas of the river were mapped and targeted for sampling during the quantitative sampling program.

RMP 5.8 South - (Downstream Pool Adjacent to Ceresco Dam)

MP 5.8 South was a newly identified location for permanent oil recovery. It is a small downstream pool on the side south of the river at the base of Ceresco Dam. The south pool is located at the base of the former power house spillway chutes. The approximate areal extent of this small pool is 0.11-acres.

Actions

MP 5.8 South was divided into 4 cells for oil recovery purposes (please refer to the sign-off sheet in the attachments for a sketch of the cell layout). Oil recovery activities ran through October 13, 2010. The cells were aerated with combination of a pond aerator, water flushing, pressure washing of the concrete areas of the power house spillway chutes, and manual raking. Oil was collected by vacuum truck, absorbent boom, pads, and pompoms. On October 13, 2010, priority site MP 5.8 South was recommended for final sign-off.

Outcome

Site MP 5.8 South was visited by USEPA and Enbridge representatives on October 17, 2010. The USEPA and Enbridge representatives entered the site by walking along the bank; no discernable oil was present. Site MP 5.8 South was cleared and received final sign-off.

Attachment Descriptions

The ensuing information listed below directly follows in this Submerged Oil Recovery Summary Report:

- USEPA and Enbridge signed Submerged Oil Remediation Status Tracking Forms.
 - Contains signatory approvals.
- Site Summary
 - Provides information used by the field teams to better understand site specific characteristics of the priority locations and determined the most appropriate recovery technology. Information included site layout, areal extent, depth to water, sediment thickness, sediment bed type, data collected, habitat description and habitat quality, containment measures, access, and recommendations.
- Pre- and Post- Submerged Oil Recovery Figures
 - Presents qualitative pre- and post- poling data in a graphical format.
- Photographs
 - Provides visual documentation of pre- and post- submerge oil recovery activities.

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 10-13-10

EPA(REP): Karen Berecz/Amanda Takaca

ENBRIDGE(REP): John Maffeo/Dale Berquist

LOCATION
(Division/Sect/MP)

MP 5.80S

CLEANUP METHODS USED

Method: aeration Notes: Partial aeration of cell 3

Method: Water flushing/raking Notes: Water flushed and raked cells 1-4, 3-4 clean

Method: Water flushed Notes: 6 concrete chambers and cell 1.

Method: Power washing Notes: Ceiling of 6 concrete chambers

OIL COLLECTION METHODS USED

Method: sorbent boom and pads.

Method: hard boomed off cells 3+4 from 1-2, and then 6 chambers to prevent cross contamination

DISCERNABLE OIL
OBSERVED (end of day)

NO

Sheen(heavy, medium, light)

Light sheen

Globules

No

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): YES

Team Lead: Dale Berquist

Comments:

Remediation Complete
SITE APPROVAL

Name

Signature

Date

EPA:

PAUL R. PEROMPAU

[Signature]

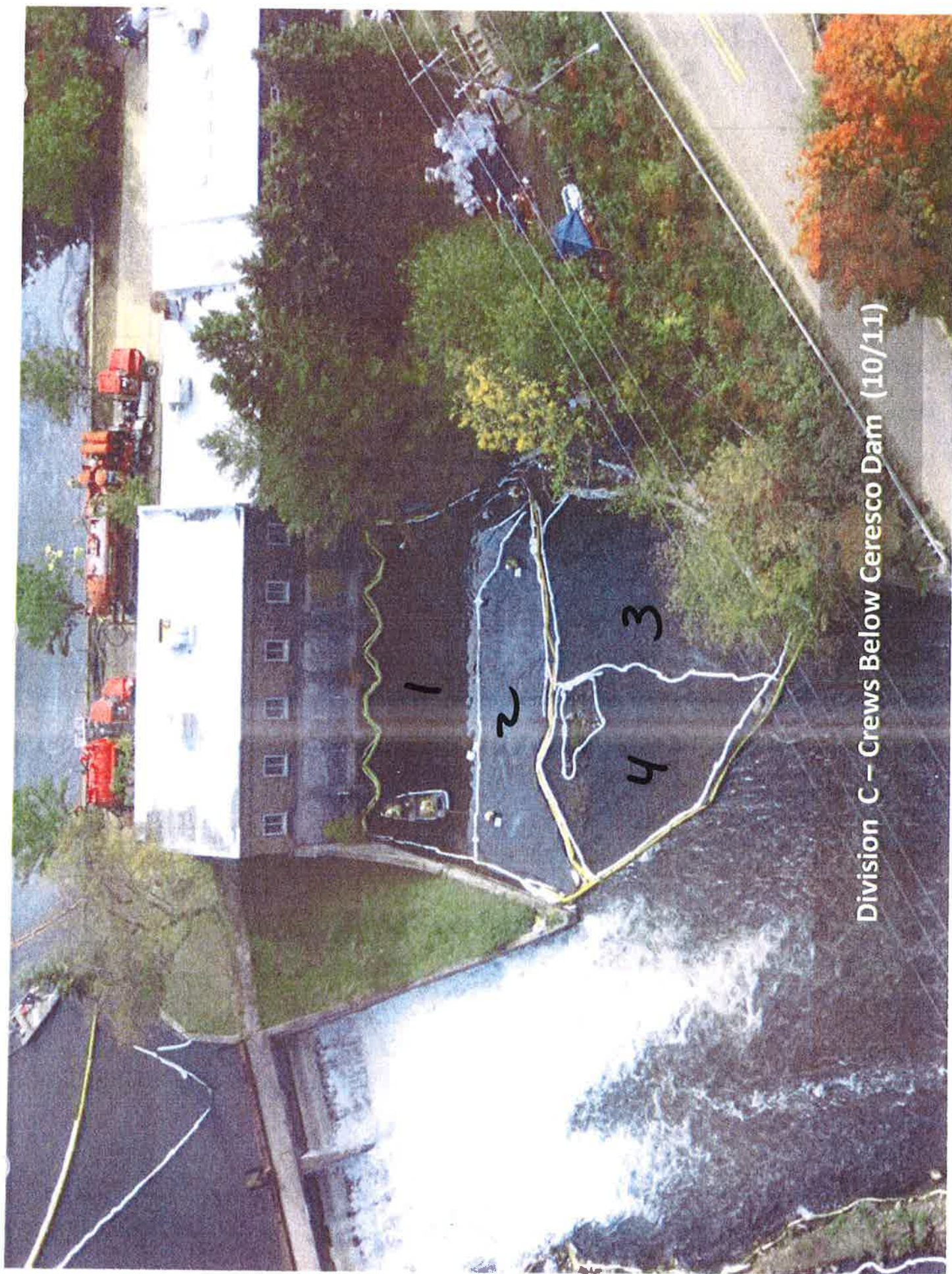
10/17/2010

Enbridge:

Joe Kackos

[Signature] 0272

10/17/10

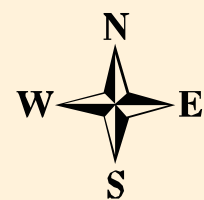
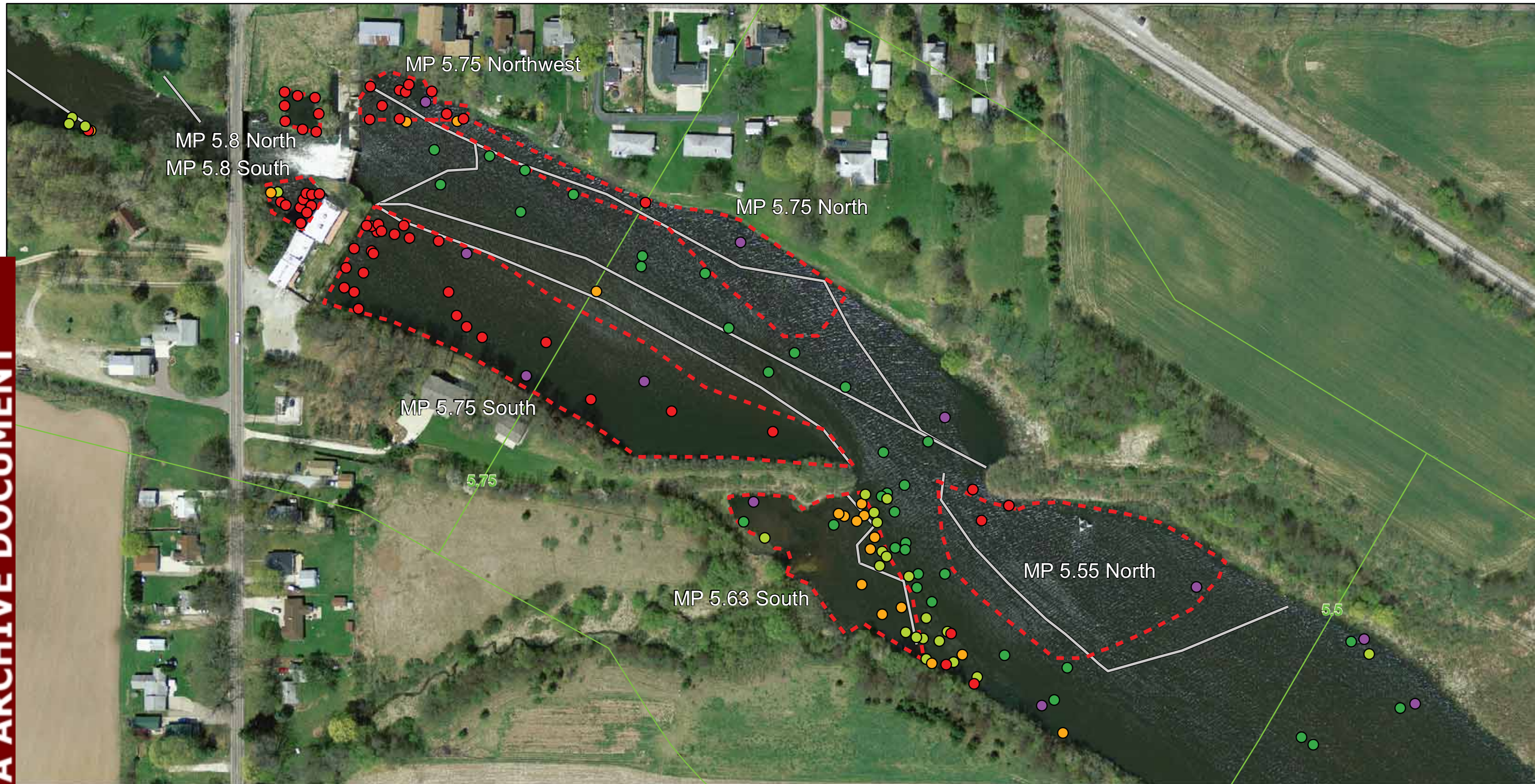


Division C – Crews Below Ceresco Dam (10/11)

SITE SUMMARY – 5.8 DOWNSTREAM OF CERESCO DAM SOUTH SIDE

The information provided below shall be used by the field teams to better understand site specific characteristics of the priority locations and determine the most appropriate recovery technology.

Site Location:	MP 5.8 Downstream of Ceresco Dam South Side
Site Layout:	See Figure Attached
Description and Geomorphic Setting:	Downstream of Dam, South Side
Approximate Areal Extent:	~0.11 acres
Approximate Depth of Water:	0 to 6 foot
Sediment thickness:	1+ feet
Bed type:	Tannish medium to coarse sand with minor component of smooth gravel with scattered cobbles
Data Collected:	
Poling (Y/N)	Y
Cores (Y/N)	Y
Lab analysis (Y/N)	Y
Community Description and Habitat Quality:	<p>Riverine Aquatic Bed</p> <p>Aquatic: Submerged, open water aquatic beds with no aquatic vegetation present. On-going excavation work prevented collection of water quality data.</p> <p>Wetland: Shoreline scrub shrub wetland replaced by smooth cobble and gravel rip-rap embankment. Riparian vegetation along bank and shoreline cut back or removed.</p> <p>Adjacent: Adjacent property consists of residential development.</p> <p>Wildlife: Open water area and eddy environment provides low energy environment for fish and waterfowl. Low energy environment provides for fish resting and staging area. Lack of overhanging shoreline vegetation may cause elevated water temperatures in near shoreline environments.</p>
Access Issues:	Accessible by shore and water
Miscellaneous:	N/A
Recommendations and Recovery Techniques:	<p>USEPA START/MDNRE ECO: USEPA/MDNRE recommended excavation to remove oil impact sediments.</p> <p>SOTF: Attempted aeration, raking and hydraulic flushing. USEPA recommends isolation, dewatering of sediments, assessment and excavation of oil impacted sediments.</p> <p>TT ECO: Concur. However, excavation of sediments and removal of riparian vegetation may require compensatory mitigation.</p>



0 150 300
1 inch = 150 feet

Legend

Pre Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy
- Observed But Quantity Not Noted



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

Poling Data Collected Through:
October 18, 2010

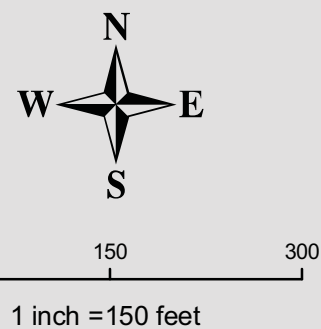
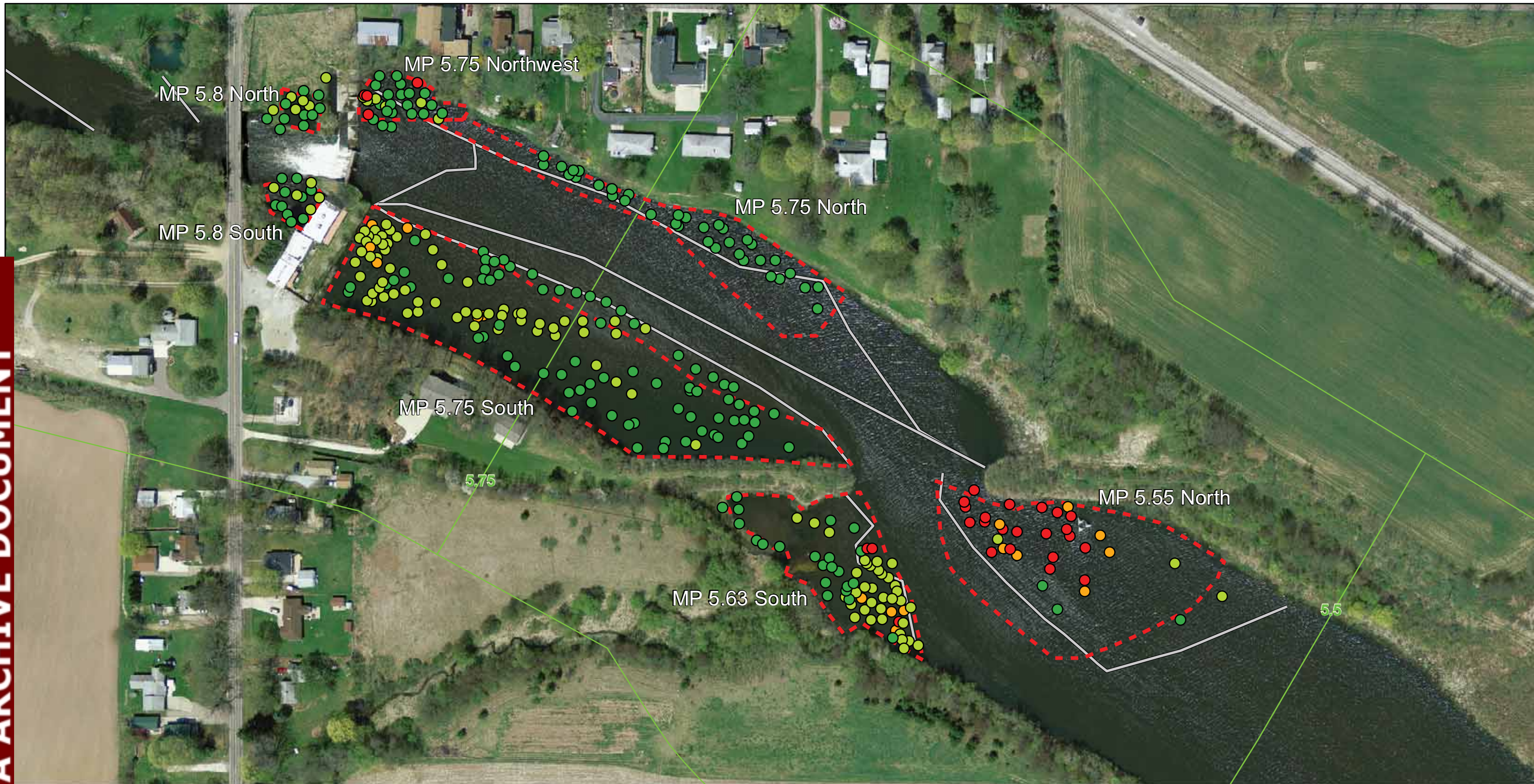
Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA PRE RECOVERY
QUALITATIVE RESULTS**
MP 5.55 N, MP 5.63 S, MP 5.75 N, MP 5.75 S,
MP 5.75 NW, MP 5.8 N, and MP 5.8 S

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 25, 2010





Legend

Post Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

**Poling Data Collected Through:
October 24, 2010**

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA POST RECOVERY
QUALITATIVE RESULTS**
MP 5.55 N, MP 5.63 S, MP 5.75 N, MP 5.75 S,
MP 5.75 NW, MP 5.8 N, and MP 5.8 S

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 26, 2010



PHOTOGRAPH LOG

Photograph 1

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.8 South

Date:
10/10/10

Description:
Recovery activities in
progress – power washing

View Direction:
Facing east



PHOTOGRAPH LOG

Photograph 2

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.8 South

Date:
10/06/10

Description:
Recovery activities in
progress – power washing

View Direction:
Facing northeast



PHOTOGRAPH LOG

Photograph 3

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.8 South

Date:
10/12/10

Description:
Recovery activities in
progress – power washing

View Direction:
Facing northeast



PHOTOGRAPH LOG

Photograph 4

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.8 South

Date:
10/07/10

Description:
Recovery activities in
progress – power washing

View Direction:
Facing east



PHOTOGRAPH LOG
Photograph 5

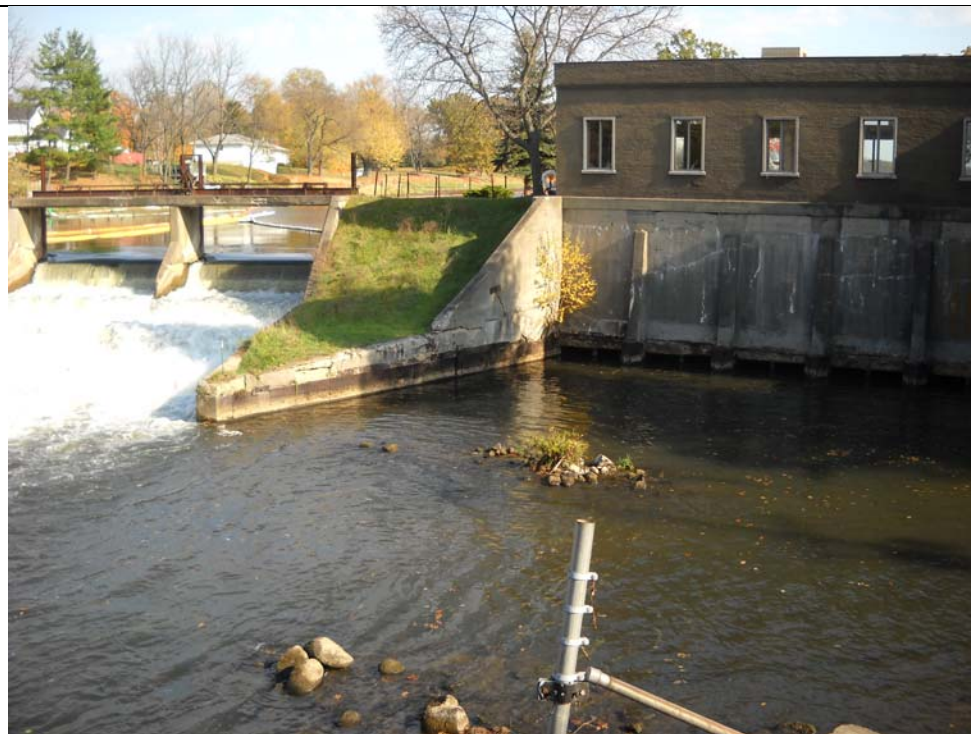
Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.8 South

Date:
10/24/10

Description:
Post Recovery – Activities
complete and containment
removed

View Direction:
Facing northeast

**PHOTOGRAPH LOG**
Photograph 6

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.8 South

Date:
10/24/10

Description:
Post Recovery – Activities
complete and containment
removed

View Direction:
Facing east



PHOTOGRAPH LOG

Photograph 7

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.8 South

Date:
10/24/10

Description:
Post Recovery – Activities
complete and containment
removed

View Direction:
Facing north



PHOTOGRAPH LOG

Photograph 8

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
5.8 South

Date:
10/24/10

Description:
Post Recovery – Activities
complete and containment
removed

View Direction:
Facing north



**Enbridge Line 6B MP 608 Pipeline Release
Marshall, Michigan**

**Permanent Recovery of Submerged Oil and Oil-Contaminated
Sediments at Priority Locations**

**Submerged Oil Recovery Summary Report
Kalamazoo River MP 7.75 (Overflow Channel)**

Enbridge Energy

EXECUTIVE SUMMARY

A Submerged Oil Task Force (SOTF) was created on Tuesday, August 24, 2010, to perform field assessment, characterization, and mapping of submerged oil impacts in surface water and sediments of Talmadge Creek, Kalamazoo River and Morrow Lake (Talmadge Creek to Kalamazoo River to River Mile Post [RMP] 40). The SOTF is comprised of representatives from the United States Environmental Protection Agency (USEPA), the Michigan Department of Natural Resources and the Environment (MDNRE), Stakeholders, Enbridge and their contractors.

As a result of the initial field assessments, 34 sites in the Kalamazoo River had been identified as potentially containing accumulations of significant amounts of submerged oil in river sediments. These areas were further investigated, and 18 were identified as high priority areas and were recommended for submerged oil recovery by the SOTF. These 18 priority areas were also subjected to an ecological habitat assessment intended to classify their ecological use and value to help guide cleanup operations. The SOTF discussed the assessment in conjunction with possible cleanup approaches, and in a September 21, 2010 memorandum the Task Force Leaders provided recommendations for oil removal for these 18 priority areas.

Initial Assessment

The Qualitative Assessment was a reconnaissance effort to identify areas with the presence of submerged oil, identify depositional areas, prioritize sites based on a relative comparison of impacted sites, and obtain information on the depositional and erosional characteristics of geomorphic settings in which the impacted sites were identified. This was accomplished by in-channel sediment poling, which consisted of inserting a graduated metal pole equipped with a foot disk, into the sediment and recording visual evidence of oil, sheen (light, moderate, or heavy), droplets, globules, and/or tar balls after the sediment was agitated. Each poling location was located by GPS, with the elevation of the water surface, depth of water, top of sediment, and depth of soft sediment recorded. The primary criterion for prioritizing sites for quantitative sampling was the visual presence of oil in the qualitative phase. These areas were identified by the Tetra Tech field scientists. Depositional areas of the river were mapped and targeted for sampling during the quantitative sampling program.

RMP 7.75 - (Overflow Channel)

MP 7.75 is a small (approximately 50 feet by 350 feet) overflow channel on left side of river looking downstream. The approximate areal extent of this priority location is 0.4 acres and the depth to water is less than 1 foot. Soft sediment overlies sand and gravel. The channel is 50-60 feet wide at the base with about a foot of water over a turbid dark brown substrate that is firmer than most depositional areas. The main channel of the river is shallow (approximately 2-6 inches deep) underlain by gravel and cobbles.

Actions

MP 7.75 North was divided into 11 cells for oil recovery purposes (please refer to the sign-off sheet in the attachments for a sketch of the cell layout). Oil recovery activities were performed on September 24 and 25, 2010. The cells were accessed from an island between this side channel and the river. The work was mainly conducted by personnel using rakes wading into the cells. Cell 1, which is located adjacent to the main river channel, was aerated with combination of raking and multiple passes with a pond aerator. Tar balls between 2 and 4 inches in diameter

were originally reported at cells 1 and 2, then after aeration no sheen to light sheen was reported. Oil was collected by using absorbent boom and pads. On September 26, 2010, priority site MP 7.75 was recommended for final sign-off.

Outcome

The site was visited by USEPA and Enbridge representatives on September 30, 2010, at 3:30 PM. The USEPA and Enbridge representatives entered the site via airboat and disturbed sediment throughout the cells; no discernable oil was noted on their sign-off documentation. Site MP 7.75 was cleared and received final sign-off.

Attachment Descriptions

The ensuing information listed below directly follows in this Submerged Oil Recovery Summary Report:

- USEPA and Enbridge signed Submerged Oil Remediation Status Tracking Form.
 - Contains signatory approvals.
- Site Summary
 - Provides information used by the field teams to better understand site specific characteristics of the priority locations and determined the most appropriate recovery technology. Information included site layout, areal extent, depth to water, sediment thickness, sediment bed type, data collected, habitat description and habitat quality, containment measures, access, and recommendations.
- Pre- and Post- Submerged Oil Recovery Figures
 - Presents qualitative pre- and post- poling data in a graphical format.
- Photographs
 - Provides visual documentation of pre- and post- submerge oil recovery activities.

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 9-26-2010

EPA(REP): John Day/Sean Kane

#

ENBRIDGE(REP): Robert Suehs/Mike Blevin

LOCATION
(Division/Sect/MP)

MP 7.75

CLEANUP METHODS USED

Method: Aeration Notes: 10% of site only -cell 1

Method: Raking Notes: Entire site

Method: Notes:

OIL COLLECTION METHODS USED

Method: Sorbent pads---collected light sheen as it appeared

Method:

DISCERNABLE OIL

OBSERVED (end of day) Very light sheen

Sheen(heavy, medium, light) Very, very light Globules no

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): YES

Team Lead: John Maffeo

Site has a lot of underbrush, focused final raking in this area

Remediation Complete

SITE APPROVAL

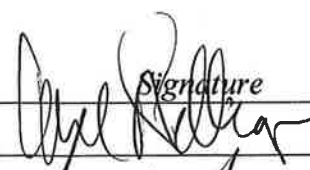
Name

Signature

Date

EPA:

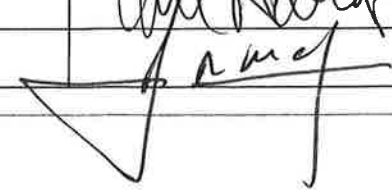
CHARL PALLERINO



9/30/10

Enbridge:

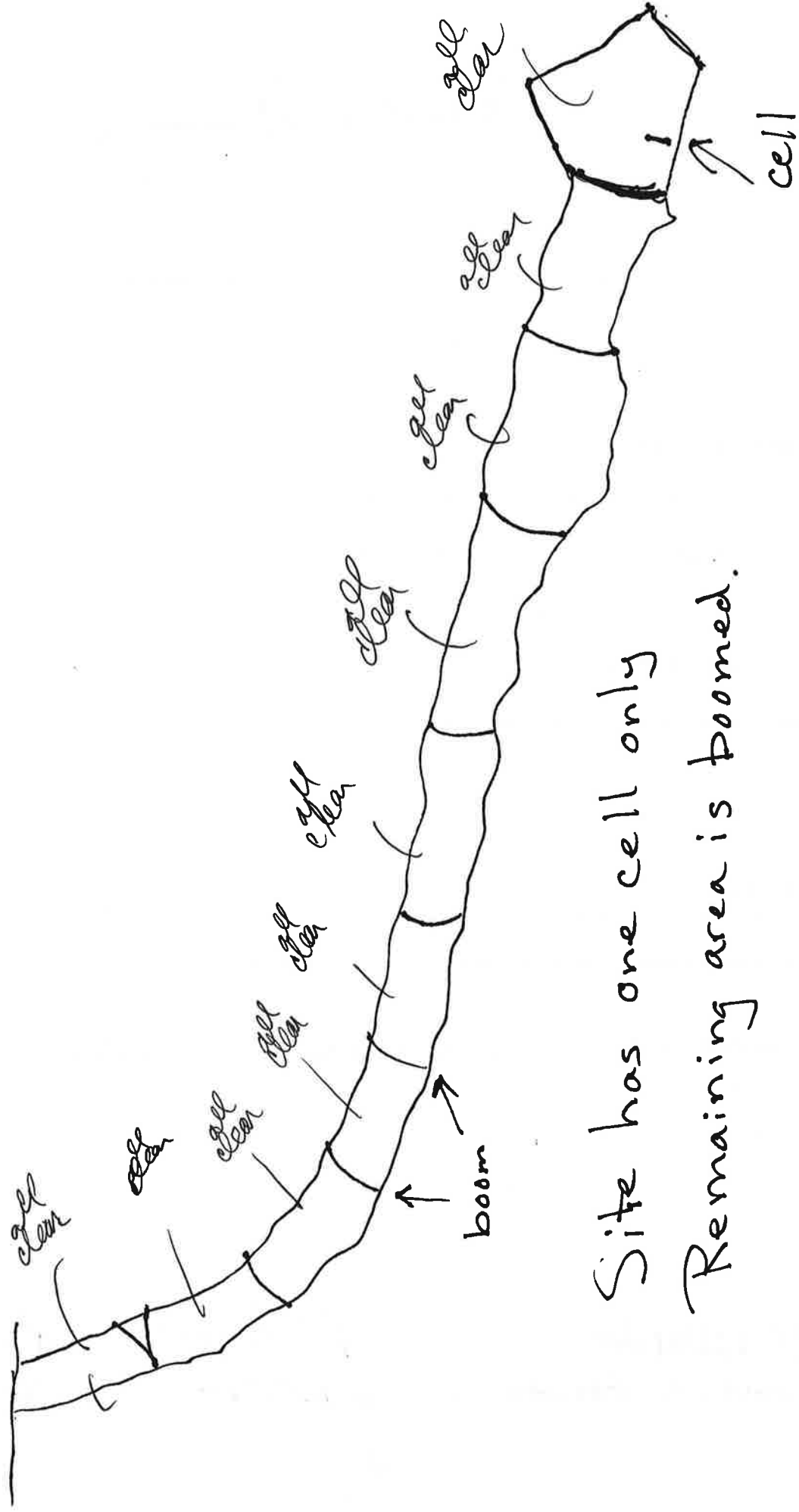
JAY M. GOVERNE



9.30.10

7/30/10 @ 1528

MP 7.75

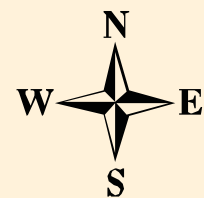


Site has one cell only
Remaining area is boomed.

SITE SUMMARY – MP 7.75

The information provided below shall be used by the field teams to better understand site specific characteristics of the priority locations and determine the most appropriate recovery technology.

Site Location:	MP 7.75
Site Layout:	See Figure Attached
Description and Geomorphic Setting:	Overflow channel on left side of river looking downstream.
Approximate Areal Extent:	0.33 to 0.66 acres
Approximate Depth of Water:	< 1 foot
Sediment thickness:	0.5 to 1.0 foot
Bed type:	Soft sediment over sand and gravel
Data Collected:	
Poling (Y/N)	Y
Cores (Y/N)	Y
Lab analysis (Y/N)	Y
Community Description and Habitat Quality:	Channel is 50-60 ft wide at the base with about 15 inches of water over a turbid dark brown substrate that is firmer than most depositional areas. Main channel of the river is shallow (2-6 inches deep) underlain by gravel and cobbles. Coarse woody debris present. This area is habitat for frogs (heard) and a nursery area for young smallmouth, minnows and shiners. Surrounding vegetation is forested on the bank with silver maple (<i>Acer saccharinum</i>), green ash (<i>Fraxinus pensylvanica</i>), and basswood (<i>Tilia americana</i>).
Containment:	Type unknown
Access Issues:	Difficult due to debris
Miscellaneous:	N/A
Recommendations:	ECO: No major ecological concerns associated with disturbance of the overflow channel. There was little sheen noted during the 14 September 2010 field visit so the area may be cleansing itself. Care should be taken if the site is accessed over land to avoid disturbance to riparian vegetation, wetlands and streambank areas. SOTF: Recommend that reasonably aggressive steps be taken to remove the oil. The technique employed would rely primarily on aeration, but may also include sediment skimming, flushing, raking or a combination of these.



0 100 200
1 inch = 100 feet

Legend

Pre Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy
- Observed But Quantity Not Noted



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

Poling Data Collected Through:
September 10, 2010

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

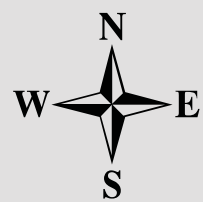
PRIORITY AREA PRE RECOVERY QUALITATIVE RESULTS MP 7.75

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 25, 2010



TETRA TECH EC, INC.



0 100 200
1 inch = 100 feet

Legend

Post Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

**Poling Data Collected Through:
October 24, 2010**

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA POST RECOVERY
QUALITATIVE RESULTS
MP 7.75**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 26, 2010



TETRA TECH EC, INC.

PHOTOGRAPH LOG

Photograph 1

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
7.75

Date:
09/25/10

Description:
Recovery activities in
progress - raking

View Direction:
Facing north



PHOTOGRAPH LOG

Photograph 2

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
7.75 North

Date:
09/25/10

Description:
Recovery activities in
progress - hard and soft
boom layout

View Direction:
Facing east



PHOTOGRAPH LOG
Photograph 3

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
7.75

Date:
09/25/10

Description:
Recovery activities in
progress – boom layout
and cell preparation

View Direction:
Facing east

**PHOTOGRAPH LOG**
Photograph 4

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
7.75

Date:
09/25/10

Description:
Recovery activities in
progress - aeration

View Direction:
Facing north



PHOTOGRAPH LOG
Photograph 5

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
7.75

Date:
10/24/10

Description:
Post Recovery conditions
– recovery actions
complete and containment
removed

View Direction:
Facing east

**PHOTOGRAPH LOG**
Photograph 6

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
7.75

Date:
10/24/10

Description:
Post Recovery conditions
– recovery actions
complete and containment
removed

View Direction:
Facing west



**Enbridge Line 6B MP 608 Pipeline Release
Marshall, Michigan**

**Permanent Recovery of Submerged Oil and Oil-Contaminated
Sediments at Priority Locations**

**Submerged Oil Recovery Summary Report
Kalamazoo River MP 12.5 (Oxbow)**

Enbridge Energy

EXECUTIVE SUMMARY

A Submerged Oil Task Force (SOTF) was created on Tuesday, August 24, 2010, to perform field assessment, characterization, and mapping of submerged oil impacts in surface water and sediments of Talmadge Creek, Kalamazoo River and Morrow Lake (Talmadge Creek to Kalamazoo River to River Mile Post [RMP] 40). The SOTF is comprised of representatives from the United States Environmental Protection Agency (USEPA), the Michigan Department of Natural Resources and the Environment (MDNRE), Stakeholders, Enbridge and their contractors.

As a result of the initial field assessments, 34 sites in the Kalamazoo River had been identified as potentially containing accumulations of significant amounts of submerged oil in river sediments. These areas were further investigated, and 18 were identified as high priority areas and were recommended for submerged oil recovery by the SOTF. These 18 priority areas were also subjected to an ecological habitat assessment intended to classify their ecological use and value to help guide cleanup operations. The SOTF discussed the assessment in conjunction with possible cleanup approaches, and in a September 21, 2010 memorandum the Task Force Leaders provided recommendations for oil removal for these 18 priority areas.

Initial Assessment

The Qualitative Assessment was a reconnaissance effort to identify areas with the presence of submerged oil, identify depositional areas, prioritize sites based on a relative comparison of impacted sites, and obtain information on the depositional and erosional characteristics of geomorphic settings in which the impacted sites were identified. This was accomplished by in-channel sediment poling, which consisted of inserting a graduated metal pole equipped with a foot disk, into the sediment and recording visual evidence of oil, sheen (light, moderate, or heavy), droplets, globules, and/or tar balls after the sediment was agitated. Each poling location was located by GPS, with the elevation of the water surface, depth of water, top of sediment, and depth of soft sediment recorded. The primary criterion for prioritizing sites for quantitative sampling was the visual presence of oil in the qualitative phase. These areas were identified by the Tetra Tech field scientists. Depositional areas of the river were mapped and targeted for sampling during the quantitative sampling program.

RMP 12.5 - (Oxbow)

MP 12.5 is an oxbow channel on right bank facing downstream; it is also downstream of the Interstate I-94 Bridge. The approximate areal extent of this priority location is 1.8 acres. The depth to water is 0.5 feet to 1.5 feet and slightly deeper in the center of the channel downstream. This channel is approximately 120 feet wide at its lower confluence with the main stem of the river, and about 3 feet deep at this point, the oxbow is underlain by dark silt.

Actions

MP 12.5 was divided into 13 cells for oil recovery purposes (please refer to the sign-off sheet in the attachments for a sketch of the cell layout). Oil recovery activities were performed October 14 through October 16, 2010. The cells were aerated with combination of water flushing wands and manual raking with workers walking in waders. Oil was collected by using absorbent boom and pads, and hand held skimmers. On October 16, 2010, priority site MP 12.5 was recommended for final sign-off.

Outcome

The site was visited by USEPA and Enbridge representatives on October 18, 2010. The USEPA and Enbridge representatives entered the site via airboat and disturbed sediment throughout the cells; no discernable oil was noted. Site MP 12.5 was cleared and received final sign-off.

Attachment Descriptions

The ensuing information listed below directly follows in this Submerged Oil Recovery Summary Report:

- USEPA and Enbridge signed Submerged Oil Remediation Status Tracking Form.
 - Contains signatory approvals.
- Site Summary
 - Provides information used by the field teams to better understand site specific characteristics of the priority locations and determined the most appropriate recovery technology. Information included site layout, areal extent, depth to water, sediment thickness, sediment bed type, data collected, habitat description and habitat quality, containment measures, access, and recommendations.
- Pre- and Post- Submerged Oil Recovery Figures
 - Presents qualitative pre- and post- poling data in a graphical format.
- Photographs
 - Provides visual documentation of pre- and post- submerge oil recovery activities.

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 10/16/10

EPA(REP): #

ENBRIDGE(REP): Dale Berquist

LOCATION
(Division/Sect/MP) MP 12.50

CLEANUP METHODS USED

Method: Water flushing Notes: All cells (1-13)

Method: Notes:

Method Notes:

OIL COLLECTION METHODS USED

Method: Sorbent pads---collected light sheen as it appeared

Method: replaced sorbent boom when recovery activities stopped

DISCERNABLE OIL
OBSERVED (end of day) no

Sheen(heavy, medium, light) no Globules no

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): YES

Team Lead: Dale Berquist

Remediation Complete
SITE APPROVAL

Name

Signature

Date

EPA:

Paul Peronard

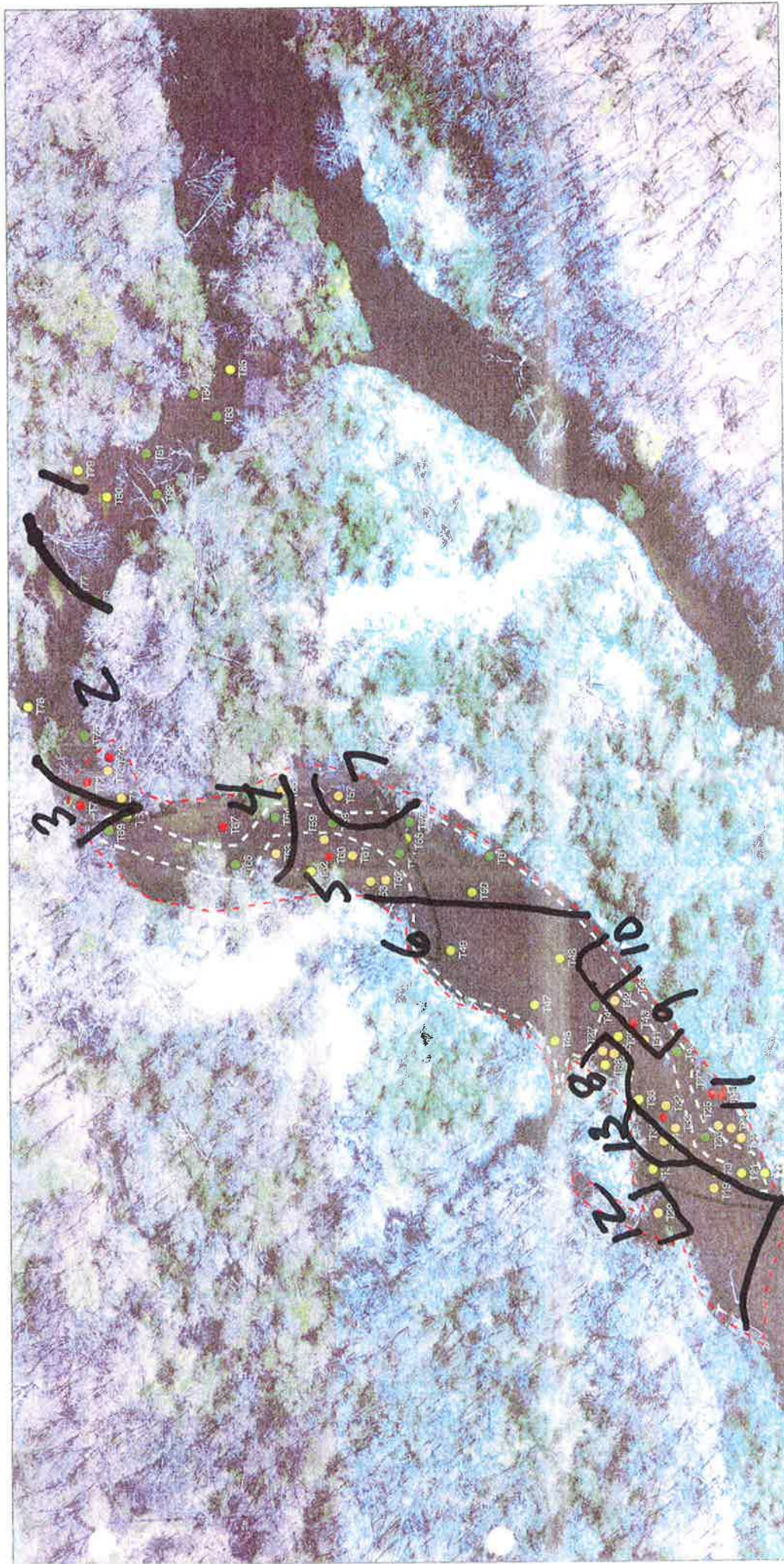
Enbridge:

J. Backos

J. Backos 0272

10/18/2010

10/18/10

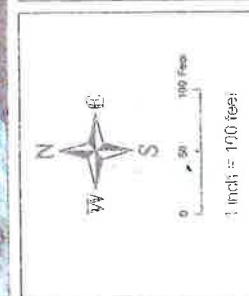


QUALITATIVE RESULTS
 PRIORITY AREA 12.5
 SUBMERGED OIL TASK FORCE
 KALAMAZOO AND CALHOUN COUNTIES
 MICHIGAN
 DATE 10/12/2010
 TETRA TECH

12.5
 C3.9

Legend
 Contaminated Sediment/Gravel After Filling
 None Observed
 Slight
 Moderate
 Heavy
 Priority Areas
 Submerged Oil Delineation Line

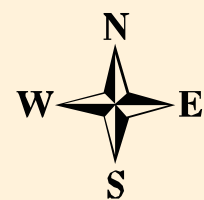
Coordinate System: Michigan State Plane North
 Horizontal Datum: NAD83
 Vertical Datum: NAVD83
 Units: International Feet



SITE SUMMARY – MP 12.50

The information provided below shall be used by the field teams to better understand site specific characteristics of the priority locations and determine the most appropriate recovery technology.

Site Location:	MP 12.50
Site Layout:	See Figure Attached
Description and Geomorphic Setting:	Oxbow Channel on right bank facing downstream.
Approximate Areal Extent:	1.75 acres
Approximate Depth of Water:	0.5 to 1.5 feet, slighter deeper in center of channel downstream
Sediment thickness:	0 to 0.5 feet
Bed type:	Silty sand over sand and gravel
Data Collected:	
Poling (Y/N)	Y
Cores (Y/N)	Y
Lab analysis (Y/N)	Y
Community Description and Habitat Quality:	High quality aquatic habitat. This channel is approximately 120 feet wide at its lower confluence with the mainstem of the river and about 3 feet deep underlain by dark silt. This area provides habitat for juvenile and adult small mouthed bass, minnows and shiners, and there appears to be a mussel bed nearby (a mussel cache was seen on the bank, deposited from a raccoon). Coarse woody debris is present, providing habitat for turtles and frogs. There are thick beds of submerged aquatic vegetation dominated by <i>Potamogeton</i> that provide food for waterfowl, herbivorous mammals and cover for fish. A duck blind is present, so it is assumed waterfowl use the area. Rice cutgrass (<i>Leersia</i>) grows along the banks. Surrounding palustrine forest is thick mature silver maple.
Containment:	300' of containment boom and X-Tex curtain
Access Issues:	Possible downed trees/vegetation in upper reaches of backwater channel
Miscellaneous:	N/A
Recommendations:	ECO: High quality habitat present. Dredging is not recommended at this location. Care should be taken not to disturb the submerged aquatic vegetation beds dominated by <i>Potamogeton</i> or the bank vegetation dominated by <i>Leersia oryzoides</i> . SOTF: Less aggressive invasive action at this time. Cautious raking and flushing will be primarily be used, taking care to avoid damage to existing vegetation. Aeration may also be used in a controlled method at specifically targeted areas, taking care to avoid damage to existing vegetation. Recommend that oil containment boom around these areas be reconfigured to allow maximum water flow into and out of these areas and that downstream collection be adequately maintained to capture potential releases.



0 100 200
1 inch = 100 feet

Legend

Pre Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy
- Observed But Quantity Not Noted

Priority Areas

Submerged Oil Delineation Area

Priority Area Approximate Containment (if known)

Division Quarter Mile Grid

**Poling Data Collected Through:
October 11, 2010**

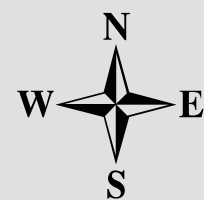
Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA PRE RECOVERY
QUALITATIVE RESULTS
MP 12.5**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 25, 2010





0 100 200
1 inch = 100 feet

Legend

Post Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

**Poling Data Collected Through:
October 20, 2010**

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA POST RECOVERY
QUALITATIVE RESULTS
MP 12.5**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 26, 2010



TETRA TECH EC, INC.

PHOTOGRAPH LOG

Photograph 1

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
12.5

Date:
10/14/10

Description:
Recovery activities in progress - raking and water washing

View Direction:
Facing north



PHOTOGRAPH LOG

Photograph 2

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
12.5

Date:
10/14/10

Description:
Pre Recovery

Raking and water washing activities in progress

View Direction:
Facing northeast



PHOTOGRAPH LOG
Photograph 3

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
12.5

Date:
10/14/10

Description:
Recovery activities in progress - raking and water washing

View Direction:
Facing north

**PHOTOGRAPH LOG**
Photograph 4

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
12.5

Date:
10/14/10

Description:
Recovery activities in place - containment structures in place

View Direction:
Facing north



PHOTOGRAPH LOG
Photograph 5

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
12.5

Date:
10/18/10

Description:
Recovery activities
complete – containment to
be removed

View Direction:
Facing west

**PHOTOGRAPH LOG**
Photograph 6

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
12.5

Date:
10/18/10

Description:
Recovery activities
complete – containment to
be removed

View Direction:
Facing east



**Enbridge Line 6B MP 608 Pipeline Release
Marshall, Michigan**

**Permanent Recovery of Submerged Oil and Oil-Contaminated
Sediments at Priority Locations**

**Submerged Oil Recovery Summary Report
Kalamazoo River MP 14.75 (Overflow Channel)**

Enbridge Energy

EXECUTIVE SUMMARY

A Submerged Oil Task Force (SOTF) was created on Tuesday, August 24, 2010, to perform field assessment, characterization, and mapping of submerged oil impacts in surface water and sediments of Talmadge Creek, Kalamazoo River and Morrow Lake (Talmadge Creek to Kalamazoo River to River Mile Post [RMP] 40). The SOTF is comprised of representatives from the United States Environmental Protection Agency (USEPA), the Michigan Department of Natural Resources and the Environment (MDNRE), Stakeholders, Enbridge and their contractors.

As a result of the initial field assessments, 34 sites in the Kalamazoo River had been identified as potentially containing accumulations of significant amounts of submerged oil in river sediments. These areas were further investigated, and 18 were identified as high priority areas and were recommended for submerged oil recovery by the SOTF. These 18 priority areas were also subjected to an ecological habitat assessment intended to classify their ecological use and value to help guide cleanup operations. The SOTF discussed the assessment in conjunction with possible cleanup approaches, and in a September 21, 2010 memorandum the Task Force Leaders provided recommendations for oil removal for these 18 priority areas.

Initial Assessment

The Qualitative Assessment was a reconnaissance effort to identify areas with the presence of submerged oil, identify depositional areas, prioritize sites based on a relative comparison of impacted sites, and obtain information on the depositional and erosional characteristics of geomorphic settings in which the impacted sites were identified. This was accomplished by in-channel sediment poling, which consisted of inserting a graduated metal pole equipped with a foot disk, into the sediment and recording visual evidence of oil, sheen (light, moderate, or heavy), droplets, globules, and/or tar balls after the sediment was agitated. Each poling location was located by GPS, with the elevation of the water surface, depth of water, top of sediment, and depth of soft sediment recorded. The primary criterion for prioritizing sites for quantitative sampling was the visual presence of oil in the qualitative phase. These areas were identified by the Tetra Tech field scientists. Depositional areas of the river were mapped and targeted for sampling during the quantitative sampling program.

RMP 14.75 - (Overflow Channel)

MP 14.75 is an overflow channel on right bank facing downstream. The overflow channel is adjacent to Rivers Edge Landscaping Supply and the east side of Interstate I-94. The approximate areal extent of this priority location is 1 acre. The depth to water is 2 feet to 3 feet and it underlain by silty sand over sand and gravel.

Actions

MP 14.75 was divided into 12 cells (these 12 cells were in split in half for a total of 24 cells, however for numbering purposes they remained 12 cells designated as left or right) for oil recovery purposes (please refer to the sign-off sheet in the attachments for a sketch of the cell layout). Oil recovery activities were performed through September 26, 2010. The cells were aerated with combination of pond aerators (cells 1 through 7, 11, and 12) and manual raking (all cells) with workers walking in waders. Oil was collected by using absorbent boom and pads. On September 26, 2010, priority site MP 14.75 was recommended for final sign-off.

Outcome

The site was visited by USEPA and Enbridge representatives on September 30, 2010, at 2:30 PM. The USEPA and Enbridge representatives entered the site via airboat and disturbed sediment throughout the cells; no globules, sheen, or discernable oil was noted on their sign-off documentation. Site MP 14.75 was cleared and received final sign-off.

Attachment Descriptions

The ensuing information listed below directly follows in this Submerged Oil Recovery Summary Report:

- USEPA and Enbridge signed Submerged Oil Remediation Status Tracking Form.
 - Contains signatory approvals.
- Site Summary
 - Provides information used by the field teams to better understand site specific characteristics of the priority locations and determined the most appropriate recovery technology. Information included site layout, areal extent, depth to water, sediment thickness, sediment bed type, data collected, habitat description and habitat quality, containment measures, access, and recommendations.
- Pre- and Post- Submerged Oil Recovery Figures
 - Presents qualitative pre- and post- poling data in a graphical format.
- Photographs
 - Provides visual documentation of pre- and post- submerge oil recovery activities.

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 9-26-2010

EPA(REP): Amanda Takac's/Brian Patterson

#

ENBRIDGE(REP): John Maffeo

LOCATION
(Division/Sect/MP)

MP 14.75

CLEANUP METHODS USED

Method: Aeration Notes: Cells 1-7, 11 12

Method: Raking Notes: All cells

Method: Notes:

OIL COLLECTION METHODS USED

Method: Sorbent pads---collected light sheen as it appeared

Method: replaced sorbent boom when recovery activities stopped

DISCERNABLE OIL

OBSERVED (end of day) Very light sheen

Sheen(heavy, medium, light) Very, very light Globules no

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): **YES**

Team Lead: John Maffeo

Remediation Complete

SITE APPROVAL

Name

Signature

Date

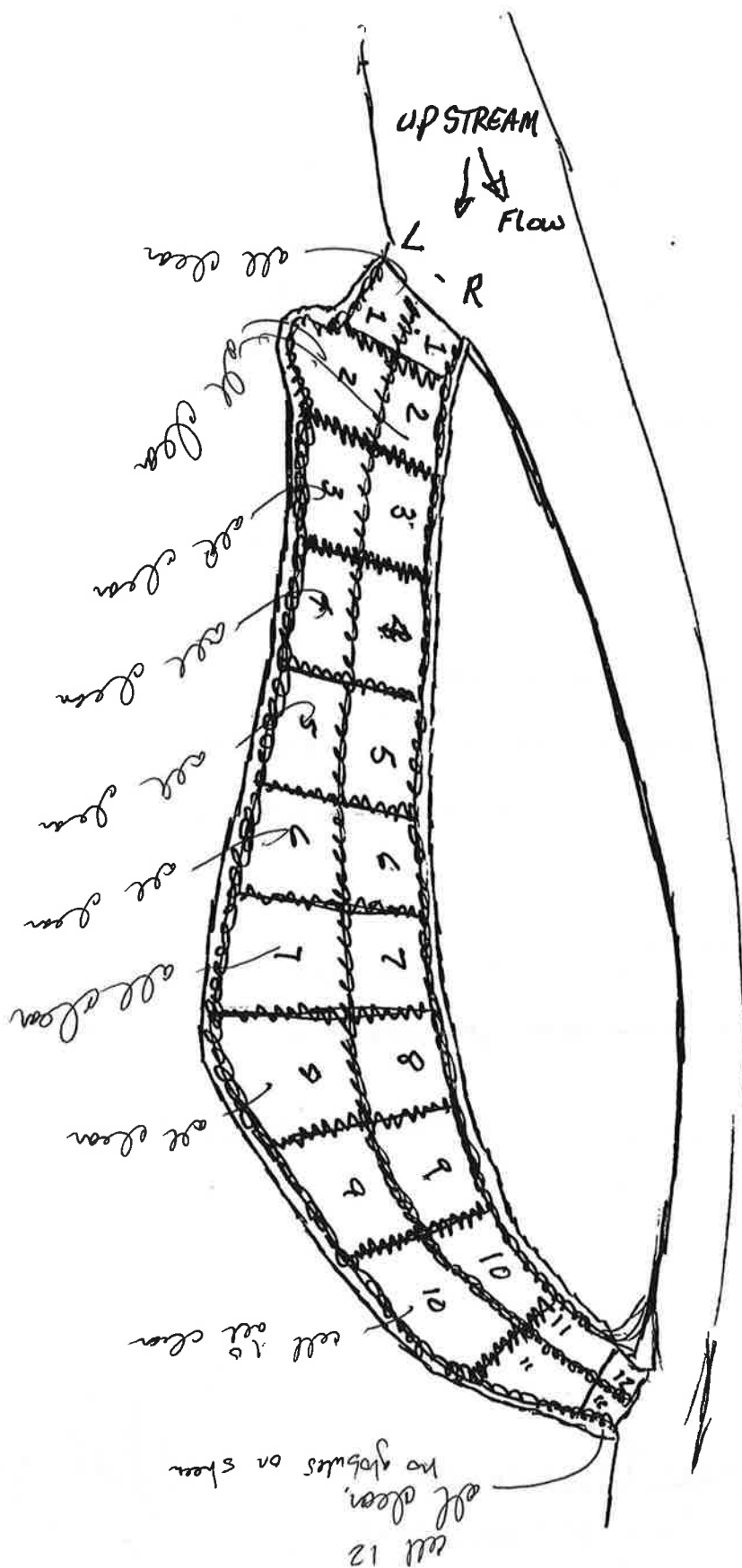
EPA: CARL BLLEBARINO

Enbridge: Jay M'GOVERN

9/30/10

9.30.10

14.75

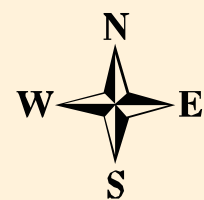


9/30/10 @ 1430

SITE SUMMARY – MP 14.75

The information provided below shall be used by the field teams to better understand site specific characteristics of the priority locations and determine the most appropriate recovery technology.

Site Location:	MP 14.75
Site Layout:	See Figure Attached
Description and Geomorphic Setting:	Overflow channel, right bank
Approximate Areal Extent:	~ 1 acre
Approximate Depth of Water:	2 to 3 feet
Sediment thickness:	0 to 1 foot
Bed type:	Silty sand over sand and gravel
Data Collected:	
Poling (Y/N)	Y
Cores (Y/N)	Y
Lab analysis (Y/N)	Y
Community Description and Habitat Quality:	Not provided in Ecological Assessment Reports
Containment:	Type unknown
Access Issues:	Easy
Miscellaneous:	Access via downstream side
Recommendations:	ECO: Not provided in Ecological Assessment Reports SOTF: Recommend that reasonably aggressive steps be taken to remove the oil. The technique employed would rely primarily on aeration, but may also include sediment skimming, flushing, raking or a combination of these.



0 100 200
1 inch = 100 feet

Legend

Pre Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy
- Observed But Quantity Not Noted

Priority Areas

Submerged Oil Delineation Area

Priority Area Approximate Containment (if known)

Division Quarter Mile Grid

Poling Data Collected Through:
September 6, 2010

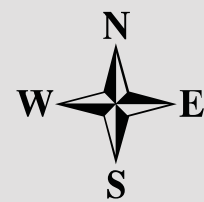
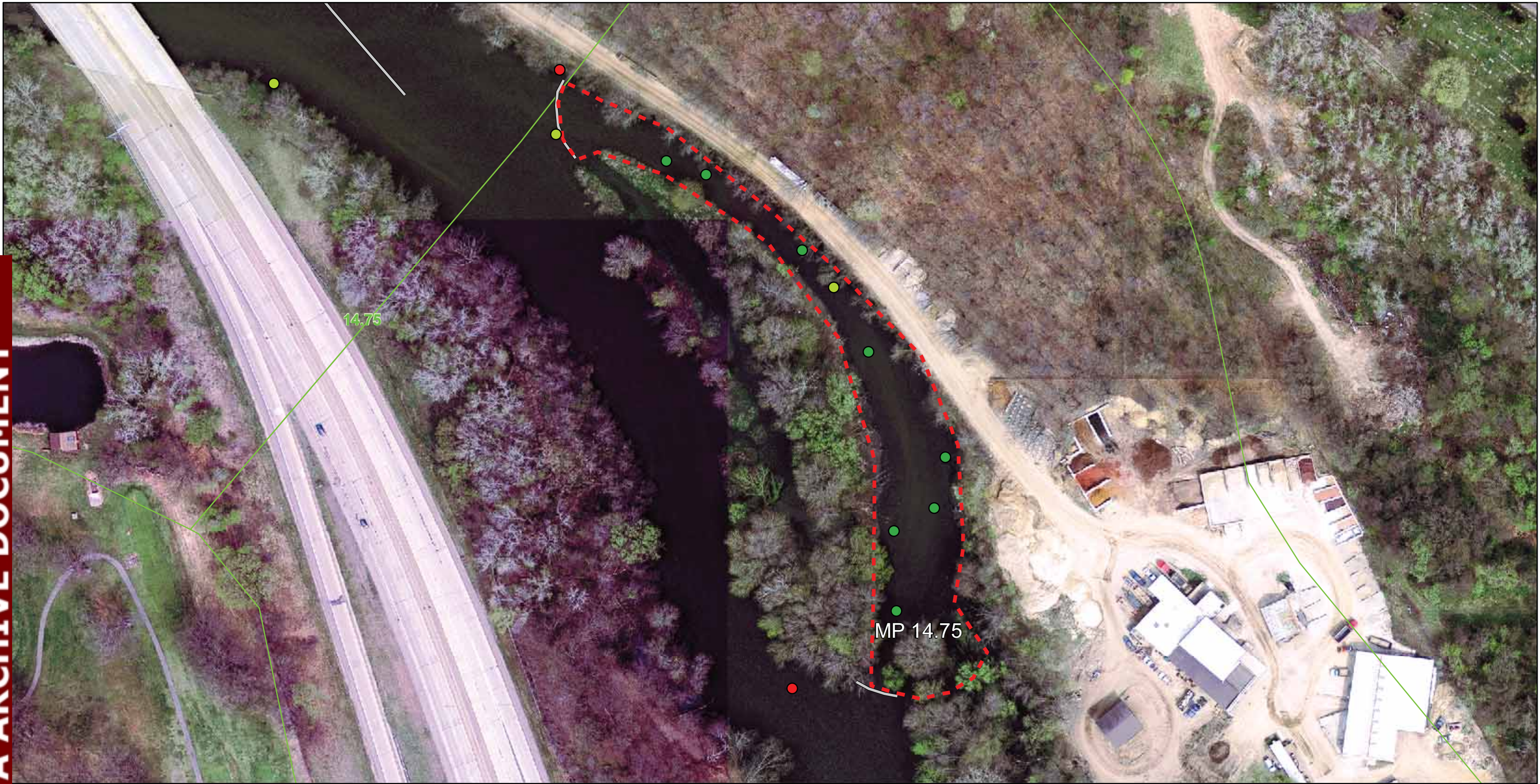
Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

PRIORITY AREA PRE RECOVERY QUALITATIVE RESULTS MP 14.75

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 25, 2010





0 100 200

1 inch = 100 feet

Legend

Post Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

Poling Data Collected Through:
October 24, 2010

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

PRIORITY AREA POST RECOVERY QUALITATIVE RESULTS MP 14.75

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 26, 2010



TETRA TECH EC, INC.

PHOTOGRAPH LOG

Photograph 1

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
14.75

Date:
09/26/10

Description:
Recovery activities in progress - Raking and water washing and cell layout

View Direction:
Facing northeast



PHOTOGRAPH LOG

Photograph 2

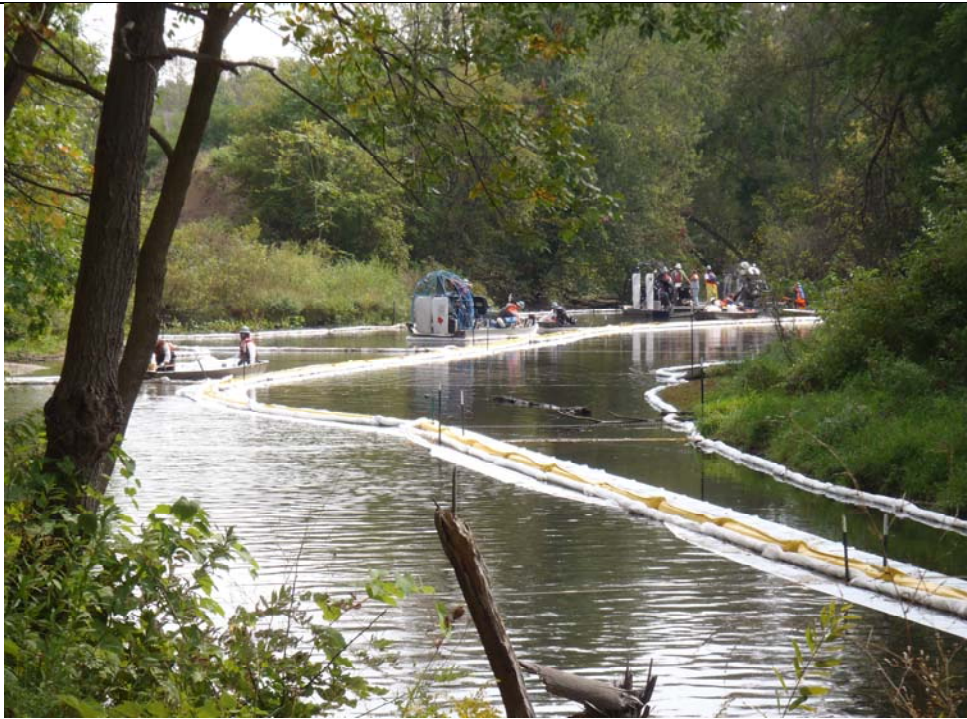
Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
14.75

Date:
09/26/10

Description:
Recovery activities in progress - Raking and water washing

View Direction:
Facing north



PHOTOGRAPH LOG

Photograph 3

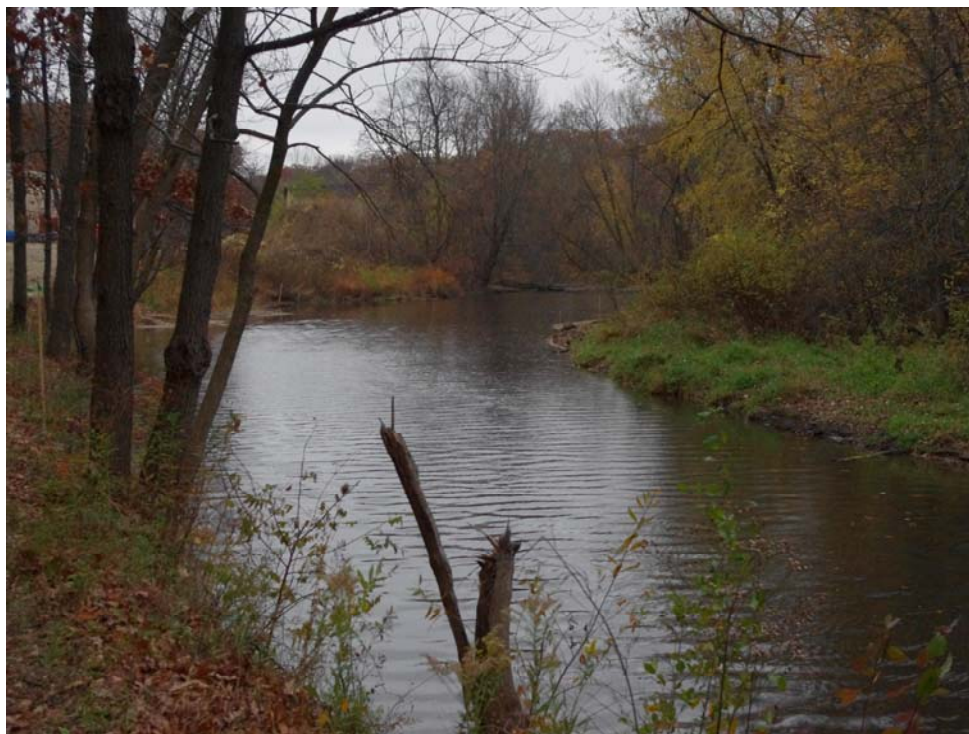
Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
14.75

Date:
10/24/10

Description:
Post recovery condition –
recovery activities
complete

View Direction:



PHOTOGRAPH LOG

Photograph 4

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
14.75

Date:
10/24/10

Description:
Post recovery condition –
recovery activities
complete

View Direction:



**Enbridge Line 6B MP 608 Pipeline Release
Marshall, Michigan**

**Permanent Recovery of Submerged Oil and Oil-Contaminated
Sediments at Priority Locations**

**Submerged Oil Recovery Summary Report
Kalamazoo River MP 15.25 South Mill Pond**

Enbridge Energy

EXECUTIVE SUMMARY

A Submerged Oil Task Force (SOTF) was created on Tuesday, August 24, 2010, to perform field assessment, characterization, and mapping of submerged oil impacts in surface water and sediments of Talmadge Creek, Kalamazoo River and Morrow Lake (Talmadge Creek to Kalamazoo River to River Mile Post [RMP] 40). The SOTF is comprised of representatives from the United States Environmental Protection Agency (USEPA), the Michigan Department of Natural Resources and the Environment (MDNRE), Stakeholders, Enbridge and their contractors.

As a result of the initial field assessments, 34 sites in the Kalamazoo River had been identified as potentially containing accumulations of significant amounts of submerged oil in river sediments. These areas were further investigated, and 18 were identified as high priority areas and were recommended for submerged oil recovery by the SOTF. These 18 priority areas were also subjected to an ecological habitat assessment intended to classify their ecological use and value to help guide cleanup operations. The SOTF discussed the assessment in conjunction with possible cleanup approaches, and in a September 21, 2010 memorandum the Task Force Leaders provided recommendations for oil removal for these 18 priority areas.

Initial Assessment

The Qualitative Assessment was a reconnaissance effort to identify areas with the presence of submerged oil, identify depositional areas, prioritize sites based on a relative comparison of impacted sites, and obtain information on the depositional and erosional characteristics of geomorphic settings in which the impacted sites were identified. This was accomplished by in-channel sediment poling, which consisted of inserting a graduated metal pole equipped with a foot disk, into the sediment and recording visual evidence of oil, sheen (light, moderate, or heavy), droplets, globules, and/or tar balls after the sediment was agitated. Each poling location was located by GPS, with the elevation of the water surface, depth of water, top of sediment, and depth of soft sediment recorded. The primary criterion for prioritizing sites for quantitative sampling was the visual presence of oil in the qualitative phase. These areas were identified by the Tetra Tech field scientists. Depositional areas of the river were mapped and targeted for sampling during the quantitative sampling program.

RMP 15.25 - (South Mill Pond)

MP 15.25 is the South Mill Pond on right bank facing downstream. The South Mill Pond is an additional backwater depositional area just south of the Burnham Street Bridge in Battle Creek. This wetland is part of a single system, the Mill Ponds, connected hydraulically by the river and separated only by the bridge. The approximate areal extent of this priority location is 9 acres. Open water areas are interspersed and consist of shallow (6 inches on average) water over dark brown silt. The depth to water is 0 to 1 ft in vegetated areas and 1 to 2 ft in areas of open water. The sediment beds consist of soft sediment.

Actions

MP 15.25 was divided into 9 cells for oil recovery purposes (please refer to the sign-off sheet in the attachments for a sketch of the cell layout). Oil recovery activities ran from October 3, 2010 through October 16, 2010, for both Mill Pond sites. The cells were aerated with a combination of pond aerators, flushing, water wands, and manual raking with workers walking in waders. In addition to the small "trash pumps" that were typically operated from the airboats, a trailer

mounted portable pump was staged at Launch Point C5 with piping run to the South Mill Pond for supplementary flushing capacity. All cells 1 through 9 were flushed 2 to 5 times each, with additional flushing efforts focusing on cells 6, 8, and 9. Pond aerators were used in cells 7, 8, and 9. Oil was collected by leaf blowers using absorbent boom and pads, skimmers, pompoms, and snares. The absorbent boom and pads were used for light sheen, whereas the pompoms/snares mopped up free oil, tar balls, and sheen. The absorbent boom was replaced when activities were complete. On October 16, 2010, priority site MP 15.25 was recommended for final sign-off.

Outcome

The site was visited by USEPA and Enbridge representatives on October 18, 2010. The USEPA and Enbridge representatives entered the site via airboat and disturbed sediment throughout the cells; no discernable oil was noted. Site MP 15.25 was cleared and received final sign-off on October 18, 2010.

Attachment Descriptions

The ensuing information listed below directly follows in this Submerged Oil Recovery Summary Report:

- USEPA and Enbridge signed Submerged Oil Remediation Status Tracking Form.
 - Contains signatory approvals.
- Site Summary
 - Provides information used by the field teams to better understand site specific characteristics of the priority locations and determined the most appropriate recovery technology. Information included site layout, areal extent, depth to water, sediment thickness, sediment bed type, data collected, habitat description and habitat quality, containment measures, access, and recommendations.
- Pre- and Post- Submerged Oil Recovery Figures
 - Presents qualitative pre- and post- poling data in a graphical format.
- Photographs
 - Provides visual documentation of pre- and post- submerge oil recovery activities.

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 10/17/2010

EPA(Rep): Amanda Takac's

#

ENBRIDGE(Rep): Dave Murphy/Dave Hoekstra

LOCATION
(Division/Sect/MP)

MP 15.25 Mill Pond

CLEANUP METHODS USED

Method:	<u>Water Flushing</u>	Notes:	All cells 1-9; each cell flushed 2-5 times each. Flushing efforts focused on cells 6,8,9 where vegetation is dense
Method:	<u>aeration</u>	Notes:	Cells 7-9—areas where vegetation is dense.
Method:		Notes:	

OIL COLLECTION METHODS USED

Method: Sorbent pads---collected light sheen as it appeared

Method: pom-poms/snare—mopped up free oil, tar balls and sheen

Method: replaced sorbent boom when recovery activities stopped

DISCERNABLE OIL
OBSERVED (end of day) no

Sheen(heavy, medium, light)	Light sheen in vegetation areas of cells 6,8,9	Globules	no
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SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): **YES**

Team Lead: Dave Murphy/Dave Hoekstra

Remediation Complete

SITE APPROVAL

Name

Signature

Date

EPA:

Paul Kackas

Enbridge:

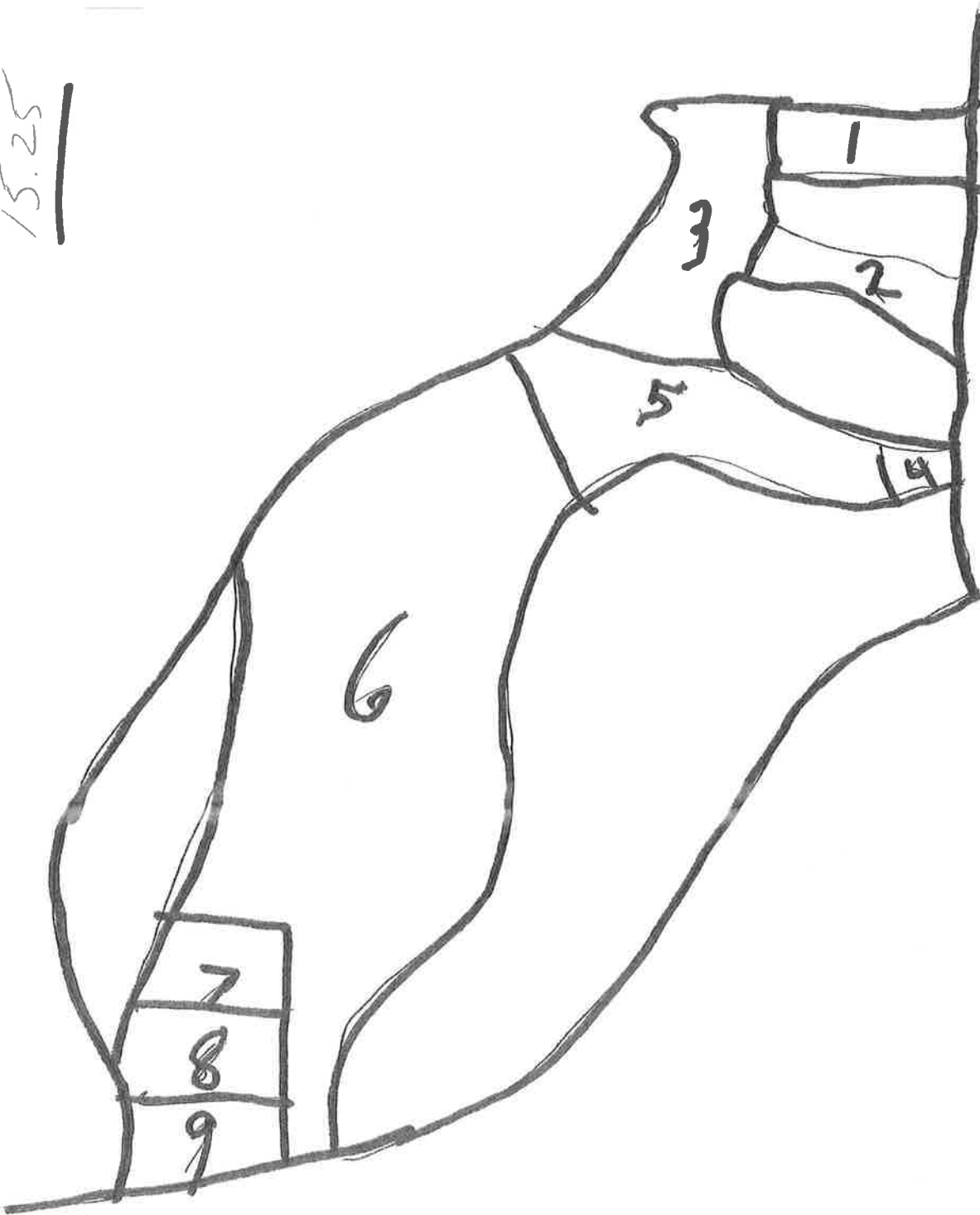
J. Kackas

J. Kackas 0272

10/18/2010

10/18/10

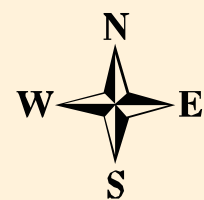
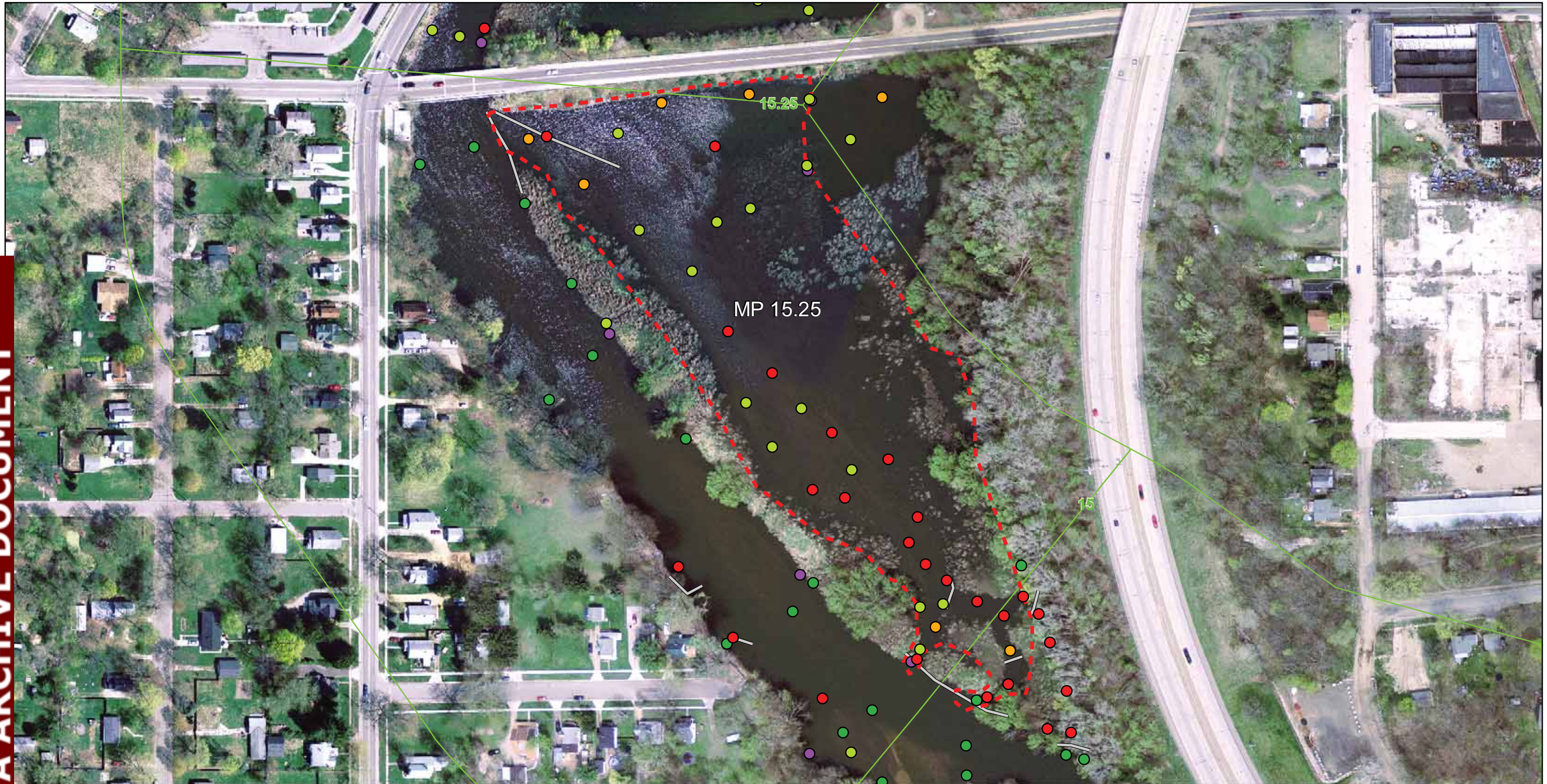
15.25



SITE SUMMARY – MP 15.25 (SOUTH MILL PONDS)

The information provided below shall be used by the field teams to better understand site specific characteristics of the priority locations and determine the most appropriate recovery technology.

Site Location:	MP 15.25
Site Layout:	See Figure Attached
Description and Geomorphic Setting:	Additional backwater depositional area just south of bridge at 42.3079, 85.188. These wetlands are part of a single system with the 3 acre to the north and connected hydraulically by the river and separated only by a bridge.
Approximate Areal Extent:	~9 acres south of Burnham
Approximate Depth of Water:	0 to 1 foot in vegetated areas, 1-2 feet in areas of open water
Sediment thickness:	2+ feet
Bed type:	Soft sediment
Data Collected:	
Poling (Y/N)	Y
Cores (Y/N)	Y
Lab analysis (Y/N)	Y
Community Description and Habitat Quality:	High quality habitat. This area is essentially a continuation of the wetland described above that is north of the bridge. North of bridge = high quality habitat. Large wetland covered with <i>Peltandra</i> , <i>Pontedaria</i> and lily pads (<i>Nymphaea</i>). Open water areas are interspersed and consist of shallow (6 inches on average) water over dark brown silt. These areas collectively provide spawning and nursery habitat for pike, pickerel, sunfish, minnows, shiners, and others. They are used by waterfowl and piscivorous birds such as osprey, kingfishers, and herons, all of which were seen in the field. They are also used by shorebirds and rails. The higher elevation areas along the edge are dominated by reed-canary grass (<i>Phalaris arundinacea</i>) and purple loosestrife (<i>Lythrum salicaria</i>), both exotic invasives.
Containment:	Hard boom and X-Tex at entrances to backwater area
Access Issues:	Burnham St. Bridge is too low for standard size airboat
Miscellaneous:	N/A
Recommendations:	ECO: This area is high quality habitat and highly sensitive to disturbance. Dredging should be avoided if possible, particularly within areas of emergent wetland vegetation. The reed-canary grass and purple loosestrife can be cut or removed if necessary, as they are exotics. Removal of these species could also be used for mitigation of impacts elsewhere. Recommend agitation or similar means to remove the oil from these sediments. SOTF: Recommend that non-aggressive remediation steps be taken with other techniques targeted at specific areas. The primary technique employed would rely on less intrusive alternative action such as "deluge" flushing. However, techniques such as aeration, sediment skimming, raking or a combination of these may be used in a controlled method at specifically targeted areas. Strongly recommend that the outlet booms at these locations be removed and downstream collection be adequately maintained to capture potential releases.



0 150 300

1 inch = 150 feet

Legend

Pre Recovery Poling Data

Observed Sheen/Globules After Poling

● None Observed

● Slight

● Moderate

● Heavy

● Observed But Quantity Not Noted

▭ Priority Areas

▭ Submerged Oil Delineation Area

▭ Priority Area Approximate Containment (if known)

▭ Division Quarter Mile Grid

**Poling Data Collected Through:
September 30, 2010**

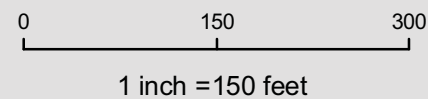
Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA PRE RECOVERY
QUALITATIVE RESULTS
MP 15.25**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 25, 2010





☐ Division Quarter Mile Grid



TETRA TECH EC, INC.

PHOTOGRAPH LOG

Photograph 1

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
15.25

Date:
10/07/10

Description:
Recovery in progress –
water washing

View Direction:
Facing north



PHOTOGRAPH LOG

Photograph 2

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
15.25

Date:
10/07/10

Description:
Pre Recovery

Water washing

View Direction:
Facing west



PHOTOGRAPH LOG

Photograph 3

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
15.25

Date:
10/07/10

Description:
Recovery activities in progress – hard and soft boom deployed

View Direction:
Facing northeast



PHOTOGRAPH LOG

Photograph 4

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
15.25

Date:
10/07/10

Description:
Recovery activities in progress – hard and soft boom deployed

View Direction:
Facing northeast



PHOTOGRAPH LOG
Photograph 5

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
15.25

Date:
10/07/10

Description:
Recovery activities in progress – hard and soft boom deployed

View Direction:
Facing north

**PHOTOGRAPH LOG**
Photograph 6

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
15.25

Date:
10/07/10

Description:
Recovery activities in progress – hard and soft boom deployed

View Direction:
Facing west



PHOTOGRAPH LOG

Photograph 7

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
15.25

Date:
10/20/10

Description:
Recovery activities
complete – boom ready to
be removed

View Direction:
Facing north



PHOTOGRAPH LOG

Photograph 8

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
15.25

Date:
10/20/10

Description:
Recovery activities
complete – boom ready to
be removed

View Direction:
Facing north



**Enbridge Line 6B MP 608 Pipeline Release
Marshall, Michigan**

**Permanent Recovery of Submerged Oil and Oil-Contaminated
Sediments at Priority Locations**

**Submerged Oil Recovery Summary Report
Kalamazoo River MP 15.5 North Mill Pond**

Enbridge Energy

EXECUTIVE SUMMARY

A Submerged Oil Task Force (SOTF) was created on Tuesday, August 24, 2010, to perform field assessment, characterization, and mapping of submerged oil impacts in surface water and sediments of Talmadge Creek, Kalamazoo River and Morrow Lake (Talmadge Creek to Kalamazoo River to River Mile Post [RMP] 40). The SOTF is comprised of representatives from the United States Environmental Protection Agency (USEPA), the Michigan Department of Natural Resources and the Environment (MDNRE), Stakeholders, Enbridge and their contractors.

As a result of the initial field assessments, 34 sites in the Kalamazoo River had been identified as potentially containing accumulations of significant amounts of submerged oil in river sediments. These areas were further investigated, and 18 were identified as high priority areas and were recommended for submerged oil recovery by the SOTF. These 18 priority areas were also subjected to an ecological habitat assessment intended to classify their ecological use and value to help guide cleanup operations. The SOTF discussed the assessment in conjunction with possible cleanup approaches, and in a September 21, 2010 memorandum the Task Force Leaders provided recommendations for oil removal for these 18 priority areas.

Initial Assessment

The Qualitative Assessment was a reconnaissance effort to identify areas with the presence of submerged oil, identify depositional areas, prioritize sites based on a relative comparison of impacted sites, and obtain information on the depositional and erosional characteristics of geomorphic settings in which the impacted sites were identified. This was accomplished by in-channel sediment poling, which consisted of inserting a graduated metal pole equipped with a foot disk, into the sediment and recording visual evidence of oil, sheen (light, moderate, or heavy), droplets, globules, and/or tar balls after the sediment was agitated. Each poling location was located by GPS, with the elevation of the water surface, depth of water, top of sediment, and depth of soft sediment recorded. The primary criterion for prioritizing sites for quantitative sampling was the visual presence of oil in the qualitative phase. These areas were identified by the Tetra Tech field scientists. Depositional areas of the river were mapped and targeted for sampling during the quantitative sampling program.

RMP 15.5 - (North Mill Pond)

MP 15.5 is the North Mill Pond on right bank facing downstream. The North Mill Pond is additional backwater depositional area just north of the Burnham Street Bridge in Battle Creek. This wetland is part of a single system, the Mill Ponds, connected hydraulically by the river and separated only by the bridge. The approximate areal extent of this priority location is 3 acres. Open water areas are interspersed and consist of shallow (6 inches on average) water over dark brown silt. The depth to water is 0 to 1 feet in vegetated areas and 1 to 2 feet in areas of open water. The sediment beds consist of soft sediment.

Actions

MP 15.5 was divided into 26 cells for oil recovery purposes (please refer to the sign-off sheet in the attachments for a sketch of the cell layout). Oil recovery activities ran from October 3, 2010 through October 16, 2010, for both Mill Pond sites. The cells were aerated with a combination of pond aerators, flushing, water wands, and manual raking with workers walking in waders. All cells 1 through 26 were flushed 2 to 4 times each, with raking efforts focusing on cells 22, 23,

and 24. Oil was collected by leaf blowers using absorbent boom and pads, skimmers, and pompoms. The absorbent boom was replaced when activities were complete. On October 16, 2010, priority site MP 15.5 was recommended for final sign-off.

Outcome

The site was visited by USEPA and Enbridge representatives on October 18, 2010. The USEPA and Enbridge representatives entered the site via airboat and disturbed sediment throughout the cells; no sheen, globules, or discernable oil was noted. Site MP 15.5 was cleared and received final sign-off on October 18, 2010.

Attachment Descriptions

The ensuing information listed below directly follows in this Submerged Oil Recovery Summary Report:

- USEPA and Enbridge signed Submerged Oil Remediation Status Tracking Form.
 - Contains signatory approvals.
- Site Summary
 - Provides information used by the field teams to better understand site specific characteristics of the priority locations and determined the most appropriate recovery technology. Information included site layout, areal extent, depth to water, sediment thickness, sediment bed type, data collected, habitat description and habitat quality, containment measures, access, and recommendations.
- Pre- and Post- Submerged Oil Recovery Figures
 - Presents qualitative pre- and post- poling data in a graphical format.
- Photographs
 - Provides visual documentation of pre- and post- submerge oil recovery activities.

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 10/16/2010

EPA(REP): Amanda Takac's

#

ENBRIDGE(REP): Dave Murphy/Dave Hoekstra

LOCATION
(Division/Sect/MP)

MP 15.5 Mill Pond

CLEANUP METHODS USED

Method: Water Flushing Notes: All cells 1-26; each cell flushed 2-4 times each

Method: raking Notes: In downstream areas of site-cells 22-24

Method: _____ Notes: _____

OIL COLLECTION METHODS USED

Method: **Sorbent pads**---collected light sheen as it appeared

Method: replaced sorbent boom when recovery activities stopped

DISCERNABLE OIL
OBSERVED (end of day) no

Sheen(heavy, medium, light) no Globules no

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): YES

Team Lead: Dave Murphy/Dave Hoekstra

Remediation Complete
SITE APPROVAL

Name

Signature

Date

EPA:

Paul R. Personant

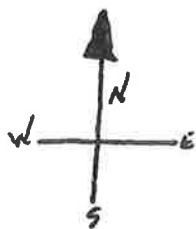
Enbridge:

J. Kackos

[Signature]

10/18/10

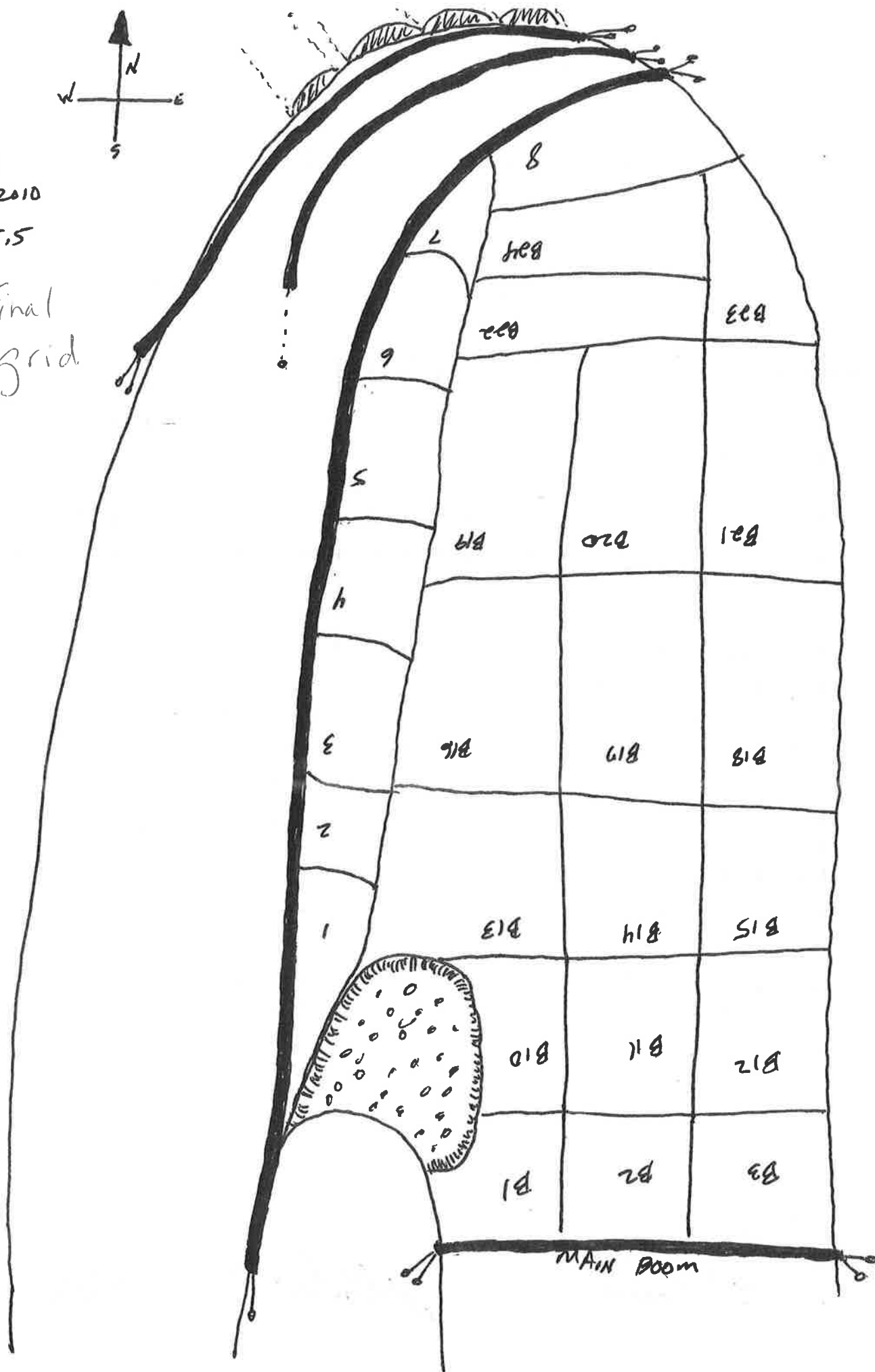
10/18/10



MAP 3
10-14-2010

MP 15.5

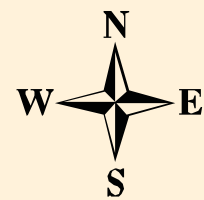
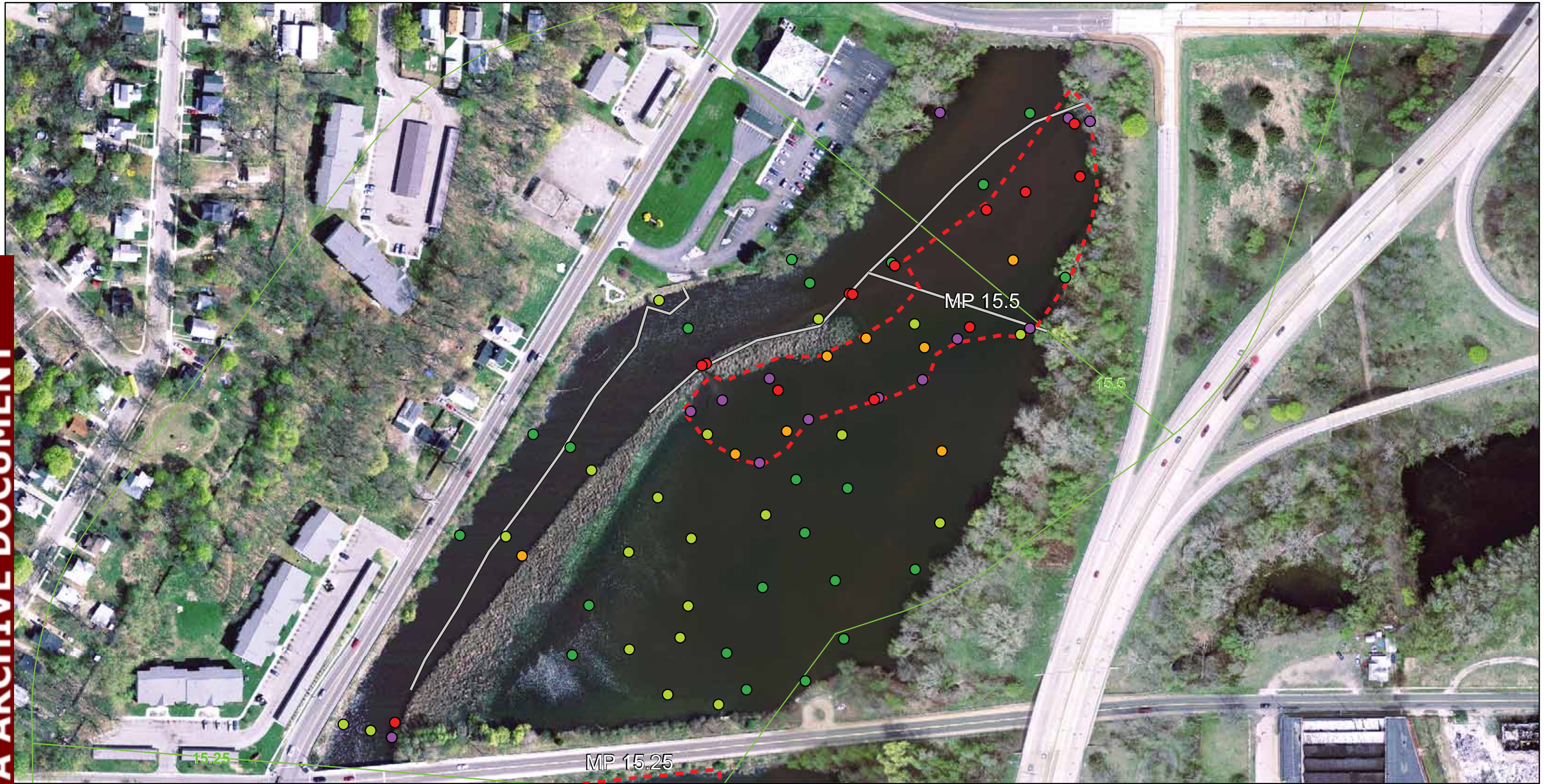
Final
grid.



SITE SUMMARY – MP 15.50 (MILL PONDS NORTH)

The information provided below shall be used by the field teams to better understand site specific characteristics of the priority locations and determine the most appropriate recovery technology.

Site Location:	MP 15.50
Site Layout:	See Figure Attached
Description and Geomorphic Setting:	Additional backwater depositional area just north of bridge at 42.3079, 85.188. This wetland area is part of a single system connected hydraulically by the river to a 9 acre area to the south and separated only by a bridge.
Approximate Areal Extent:	~3 acres north of Burnham
Approximate Depth of Water:	0 to 1 foot in vegetated areas, 1-2 feet in areas of open water
Sediment thickness:	2+ feet
Bed type:	Soft sediment
Data Collected:	
Poling (Y/N)	Y
Cores (Y/N)	Y
Lab analysis (Y/N)	Y
Community Description and Habitat Quality:	High quality habitat. This area is essentially a continuation of the wetland described above that is north of the bridge. North of bridge = high quality habitat. Large wetland covered with <i>Peltandra</i> , <i>Pontedaria</i> and lily pads (<i>Nymphaea</i>). Open water areas are interspersed and consist of shallow (6 inches on average) water over dark brown silt. These areas collectively provide spawning and nursery habitat for pike, pickerel, sunfish, minnows, shiners, and others. They are used by waterfowl and piscivorous birds such as osprey, kingfishers, and herons, all of which were seen in the field. They are also used by shorebirds and rails. The higher elevation areas along the edge are dominated by reed-canary grass (<i>Phalaris arundinacea</i>) and purple loosestrife (<i>Lythrum salicaria</i>), both exotic invasives.}
Containment:	Hard boom and X-Tex at entrances to backwater area
Access Issues:	Burnham St. Bridge is too low for standard size airboat
Miscellaneous:	N/A
Recommendations:	ECO: This area is high quality habitat and highly sensitive to disturbance. Dredging should be avoided if possible, particularly within areas of emergent wetland vegetation. The reed-canary grass and purple loosestrife can be cut or removed if necessary, as they are exotics. Removal of these species could also be used for mitigation of impacts elsewhere. Recommend agitation or similar means to remove the oil from these sediments. SOTF: Recommend that non-aggressive remediation steps be taken with other techniques targeted at specific areas. The primary technique employed would rely on less intrusive alternative action such as "deluge" flushing. However, techniques such as aeration, sediment skimming, raking or a combination of these may be used in a controlled method at specifically targeted areas. Strongly recommend that the outlet booms at these locations be removed and downstream collection be adequately maintained to capture potential releases.



0 150 300
1 inch = 100 feet

Legend

Pre Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy
- Observed But Quantity Not Noted

Priority Areas

Submerged Oil Delineation Area

Priority Area Approximate Containment (if known)

Division Quarter Mile Grid

**Poling Data Collected Through:
September 30, 2010**

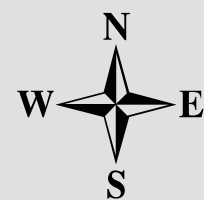
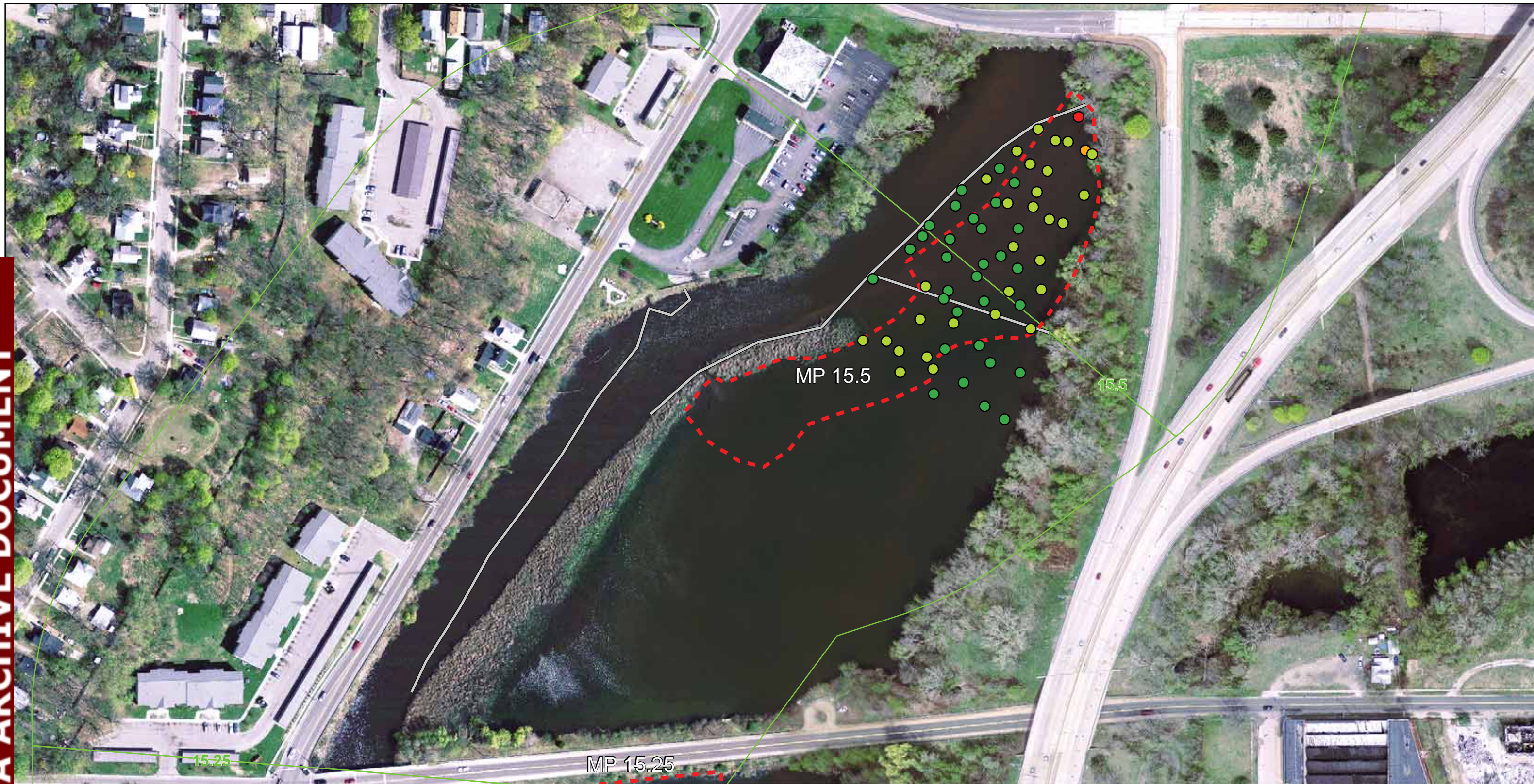
Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA PRE RECOVERY
QUALITATIVE RESULTS
MP 15.5**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 25, 2010





0 150 300

1 inch = 100 feet

Legend

Post Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

**Poling Data Collected Through:
October 19, 2010**

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA POST RECOVERY
QUALITATIVE RESULTS
MP 15.5**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 26, 2010



TETRA TECH EC, INC.

PHOTOGRAPH LOG
Photograph 1

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
15.50

Date:
10/07/10

Description:
Recovery activities in
progress - water washing

View Direction:
Facing north

**PHOTOGRAPH LOG**
Photograph 2

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
15.50

Date:
10/07/10

Description:
Recovery activities in
progress - water washing

View Direction:
Facing west



PHOTOGRAPH LOG
Photograph 3

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
15.50

Date:
10/07/10

Description:
Recovery activities in
progress - water washing

View Direction:
Facing north

**PHOTOGRAPH LOG**
Photograph 4

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
15.50

Date:
10/07/10

Description:
Recovery activities in
progress – water washing

View Direction:
Facing west



PHOTOGRAPH LOG
Photograph 5

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
15.50

Date:
10/07/10

Description:
Recovery activities in
progress - water washing

View Direction:
Facing north

**PHOTOGRAPH LOG**
Photograph 6

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
15.50

Date:
10/07/10

Description:
Recovery activities in
progress - water washing

View Direction:
Facing west



PHOTOGRAPH LOG

Photograph 7

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
15.50

Date:
10/20/10

Description:
Recovery activities
complete – containment
ready to be removed

View Direction:
Facing north



PHOTOGRAPH LOG

Photograph 8

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
15.50

Date:
10/20/10

Description:
Recovery activities
complete – containment
ready to be removed

View Direction:
Facing north



**Enbridge Line 6B MP 608 Pipeline Release
Marshall, Michigan**

**Permanent Recovery of Submerged Oil and Oil-Contaminated
Sediments at Priority Locations**

**Submerged Oil Recovery Summary Report
Kalamazoo River MP 21.5 Oxbow**

Enbridge Energy

EXECUTIVE SUMMARY

A Submerged Oil Task Force (SOTF) was created on Tuesday, August 24, 2010, to perform field assessment, characterization, and mapping of submerged oil impacts in surface water and sediments of Talmadge Creek, Kalamazoo River and Morrow Lake (Talmadge Creek to Kalamazoo River to River Mile Post [RMP] 40). The SOTF is comprised of representatives from the United States Environmental Protection Agency (USEPA), the Michigan Department of Natural Resources and the Environment (MDNRE), Stakeholders, Enbridge and their contractors.

As a result of the initial field assessments, 34 sites in the Kalamazoo River had been identified as potentially containing accumulations of significant amounts of submerged oil in river sediments. These areas were further investigated, and 18 were identified as high priority areas and were recommended for submerged oil recovery by the SOTF. These 18 priority areas were also subjected to an ecological habitat assessment intended to classify their ecological use and value to help guide cleanup operations. The SOTF discussed the assessment in conjunction with possible cleanup approaches, and in a September 21, 2010 memorandum the Task Force Leaders provided recommendations for oil removal for these 18 priority areas.

Initial Assessment

The Qualitative Assessment was a reconnaissance effort to identify areas with the presence of submerged oil, identify depositional areas, prioritize sites based on a relative comparison of impacted sites, and obtain information on the depositional and erosional characteristics of geomorphic settings in which the impacted sites were identified. This was accomplished by in-channel sediment poling, which consisted of inserting a graduated metal pole equipped with a foot disk, into the sediment and recording visual evidence of oil, sheen (light, moderate, or heavy), droplets, globules, and/or tar balls after the sediment was agitated. Each poling location was located by GPS, with the elevation of the water surface, depth of water, top of sediment, and depth of soft sediment recorded. The primary criterion for prioritizing sites for quantitative sampling was the visual presence of oil in the qualitative phase. These areas were identified by the Tetra Tech field scientists. Depositional areas of the river were mapped and targeted for sampling during the quantitative sampling program.

RMP 21.5 - (Oxbow)

MP 21.5 is an open water meander with a constriction that makes it depositional; the oxbow is on right bank facing downstream. The oxbow supports a fairly high quality habitat, mostly an open water area. The approximate areal extent of this priority location is 2.5 acres. The depth to water is 0 to 1 feet, slightly deeper in the center of the channel. The sediment bed consists of soft sediment over sand.

Actions

MP 21.5 was divided into 6 cells for oil recovery purposes (please refer to the sign-off sheet in the enclosed attachments for a sketch of the cell layout). Oil recovery activities ran through October 20, 2010. The cells were aerated with a combination of pond aerators, flushing, water wands, and manual raking with workers walking in waders. Oil was collected by leaf blowers using absorbent boom and pads. The absorbent boom was replaced when activities were complete. On October 20, 2010, priority site MP 21.5 was recommended for final sign-off.

Outcome

The site was visited by USEPA and Enbridge representatives on October 22, 2010. The USEPA and Enbridge representatives entered the site via airboat and disturbed sediment throughout the cells; no discernable oil was noted. Site MP 21.5 was cleared and received final sign-off on October 22, 2010.

Attachment Descriptions

The ensuing information listed below directly follows in this Submerged Oil Recovery Summary Report:

- USEPA and Enbridge signed Submerged Oil Remediation Status Tracking Form.
 - Contains signatory approvals.
- Site Summary
 - Provides information used by the field teams to better understand site specific characteristics of the priority locations and determined the most appropriate recovery technology. Information included site layout, areal extent, depth to water, sediment thickness, sediment bed type, data collected, habitat description and habitat quality, containment measures, access, and recommendations.
- Pre- and Post- Submerged Oil Recovery Figures
 - Presents qualitative pre- and post- poling data in a graphical format.
- Photographs
 - Provides visual documentation of pre- and post- submerge oil recovery activities.

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 10/22/10

EPA(REP): #

ENBRIDGE(REP): John Sonnenberg

LOCATION
(Division/Sect/MP) MP 21.50

CLEANUP METHODS USED

Method: Water flushing Notes: All cells (1-6), multiple passes (e.g., 6-8) each.

Method: Notes:

Method: Notes:

OIL COLLECTION METHODS USED

Method: Sorbent pads---collected sheen as it appeared

Method: replaced sorbent boom when recovery activities stopped

DISCERNABLE OIL
OBSERVED (end of day) no

Sheen(heavy, medium, light) no Globules no

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): **YES**

Team Lead: John Sonnenberg

Remediation Complete
SITE APPROVAL

Name

Signature

Date

EPA:

PAUL R. PERONARD

Enbridge:

Joe Kackos

[Signature]
0272

10/23/2010
10/22/10



**DS-
21.5**

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

QUALITATIVE RESULTS
PRIORITY AREA 21.5

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

DATE: 10/13/2010

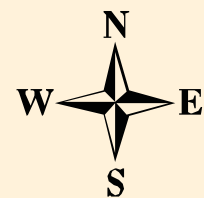


TETRA TECH

SITE SUMMARY – MP 21.50

The information provided below shall be used by the field teams to better understand site specific characteristics of the priority locations and determine the most appropriate recovery technology.

Site Location:	MP 21.50
Site Layout:	See Figure Attached
Description and Geomorphic Setting:	Oxbow, open water meander with constriction that makes it depositional
Approximate Areal Extent:	~2.5 acres
Approximate Depth of Water:	0 to 1 foot, slightly deeper in center of channel
Sediment thickness:	0.5 to 1.0 foot
Bed type:	Soft sediment over sand
Data Collected:	
Poling (Y/N)	Y
Cores (Y/N)	Y
Lab analysis (Y/N)	Y
Community Description and Habitat Quality:	Fairly high quality habitat within the oxbow. Mostly open water area, but margins contain <i>Peltandra</i> in some areas. Habitat for both fish and waterbirds.
Containment:	Further poling data provided operations with additional delineation as to where recovery operations will be focused. Please see the attached figure for the operational area. Additional silt fence was installed to better contain the area.
Access Issues:	Possible trees blocking channel at back of oxbow, may require access from both ends
Miscellaneous:	N/A
Recommendations:	ECO: Impacts to this area could easily be avoided by avoiding disturbance to vegetated areas. SOTF: Less aggressive invasive action at this time. Cautious raking and flushing will be primarily be used, taking care to avoid damage to existing vegetation. Aeration may also be used in a controlled method at specifically targeted areas, taking care to avoid damage to existing vegetation. Recommend that oil containment boom around these areas be reconfigured to allow maximum water flow into and out of these areas and that downstream collection be adequately maintained to capture potential releases.
Recovery Techniques:	Conditions at MP 21.5 are significantly altered by water level. Operations at this site will follow the <i>Standard Operations Procedure for Submerged Oil Recovery</i> . Operations may encounter extremely shallow water and must be careful of the footprint the equipment and personnel may have, especially boats, aerators, flushing activities, and wading activities. Aeration will be the primary recovery technique where the depth is sufficient. Slight raking and flushing will be used in shallow areas where aeration is not possible. The oiling conditions vary through the oxbow and operations may only need to do 1 sweep in many areas. Additional sweeps will be done when discernible oil is found.



0 100 200
1 inch = 100 feet

Legend

Pre Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy
- Observed But Quantity Not Noted

Priority Areas

Submerged Oil Delineation Area

Priority Area Approximate Containment (if known)

Division Quarter Mile Grid

Poling Data Collected Through:
October 12, 2010

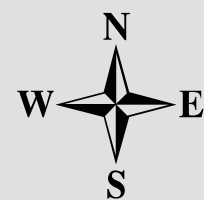
Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

PRIORITY AREA PRE RECOVERY QUALITATIVE RESULTS MP 21.5

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 25, 2010





0 100 200
1 inch = 100 feet

Legend

Post Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

**Poling Data Collected Through:
October 24, 2010**

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA POST RECOVERY
QUALITATIVE RESULTS
MP 21.5**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 26, 2010



TETRA TECH EC, INC.

PHOTOGRAPH LOG

Photograph 1

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
21.50

Date:
10/20/10

Description:
Recovery activities in progress – water washing and oil collection

View Direction:
Facing south



PHOTOGRAPH LOG

Photograph 2

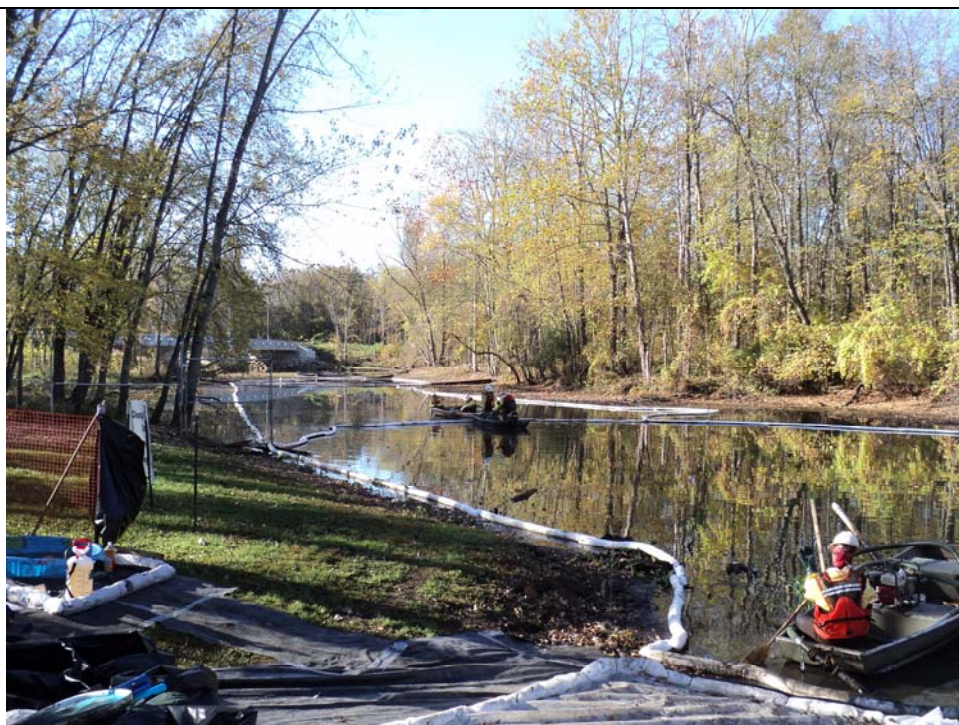
Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
21.50

Date:
10/19/10

Description:
Recovery activities in progress – water washing and oil collection

View Direction:
Facing southeast



PHOTOGRAPH LOG

Photograph 3

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
21.50

Date:
10/22/10

Description:
Recovery activities
complete

View Direction:
Facing southeast



PHOTOGRAPH LOG

Photograph 4

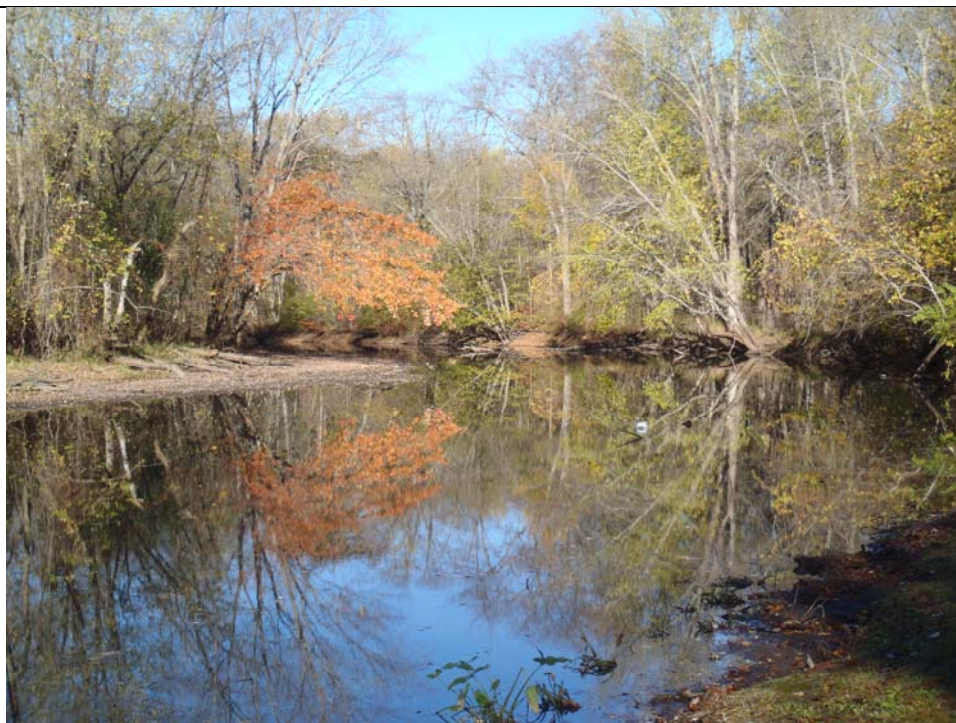
Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
21.50

Date:
10/22/10

Description:
Recovery activities
complete

View Direction:
Facing south



**Enbridge Line 6B MP 608 Pipeline Release
Marshall, Michigan**

**Permanent Recovery of Submerged Oil and Oil-Contaminated
Sediments at Priority Locations**

**Submerged Oil Recovery Summary Report
Kalamazoo River MP 26.0 Backwater Cove**

Enbridge Energy

EXECUTIVE SUMMARY

A Submerged Oil Task Force (SOTF) was created on Tuesday, August 24, 2010, to perform field assessment, characterization, and mapping of submerged oil impacts in surface water and sediments of Talmadge Creek, Kalamazoo River and Morrow Lake (Talmadge Creek to Kalamazoo River to River Mile Post [RMP] 40). The SOTF is comprised of representatives from the United States Environmental Protection Agency (USEPA), the Michigan Department of Natural Resources and the Environment (MDNRE), Stakeholders, Enbridge and their contractors.

As a result of the initial field assessments, 34 sites in the Kalamazoo River had been identified as potentially containing accumulations of significant amounts of submerged oil in river sediments. These areas were further investigated, and 18 were identified as high priority areas and were recommended for submerged oil recovery by the SOTF. These 18 priority areas were also subjected to an ecological habitat assessment intended to classify their ecological use and value to help guide cleanup operations. The SOTF discussed the assessment in conjunction with possible cleanup approaches, and in a September 21, 2010 memorandum the Task Force Leaders provided recommendations for oil removal for these 18 priority areas.

Initial Assessment

The Qualitative Assessment was a reconnaissance effort to identify areas with the presence of submerged oil, identify depositional areas, prioritize sites based on a relative comparison of impacted sites, and obtain information on the depositional and erosional characteristics of geomorphic settings in which the impacted sites were identified. This was accomplished by in-channel sediment poling, which consisted of inserting a graduated metal pole equipped with a foot disk, into the sediment and recording visual evidence of oil, sheen (light, moderate, or heavy), droplets, globules, and/or tar balls after the sediment was agitated. Each poling location was located by GPS, with the elevation of the water surface, depth of water, top of sediment, and depth of soft sediment recorded. The primary criterion for prioritizing sites for quantitative sampling was the visual presence of oil in the qualitative phase. These areas were identified by the Tetra Tech field scientists. Depositional areas of the river were mapped and targeted for sampling during the quantitative sampling program.

RMP 26.0 - (Backwater Cove)

MP 26 is a backwater pool on the right side of the river facing downstream. The shallow backwater inlet is about 1 acre in extent, surrounded by wetland forest on two sides, and a residence on the third. A portion of the site is a mudflat. Water depth is 0.5 feet or less, overlying dark organic silt. The vegetation is sparse; mostly purple loosestrife when present. The sediment bed consists of soft sediment.

Actions

MP 26 was divided into 15 cells for oil recovery purposes (please refer to the sign-off sheet in the enclosed attachments for a sketch of the cell layout). Oil recovery activities ran from September 27, 2010 through October 5, 2010. The cells were aerated with a combination of pond aerators, flushing, water wands, and manual raking with workers walking in waders. Oil was collected by leaf blowers using absorbent boom and pads and hand held skimmers. The absorbent boom was replaced when activities were completed. On October 5, 2010, priority site MP 26 was recommended for final sign-off.

Outcome

The site was visited by USEPA and Enbridge representatives on October 1, 3, and 6, 2010. The USEPA and Enbridge representatives entered the site via airboat and disturbed sediment throughout the cells. On October 1, 2010, light sheen was observed in cells C1 through C4 and D1 through D4. No tar ball or globules were observed in the "A" or "B" cells. The C, D, and E cells need additional work to recover removable oil. Site MP 21.5 was not cleared on October 1, 2010. The site was revisited on October 3, 2010, and the cells were entered with an airboat. No globules or tar balls were noted. However, the site still contained enough removable sheen. The USEPA and Enbridge representatives recommended removing the contaminated absorbent boom and rechecking the site. On October 6, 2010, the site was revisited by USEPA and Enbridge representatives. No tar balls observed; only very small areas of light sheen/trace sheen seen, which was not recoverable. No discernable oil observed. Site MP 26 was cleared and received final sign-off.

Attachment Descriptions

The ensuing information listed below directly follows in this Submerged Oil Recovery Summary Report:

- USEPA and Enbridge signed Submerged Oil Remediation Status Tracking Form.
 - Contains signatory approvals.
- Site Summary
 - Provides information used by the field teams to better understand site specific characteristics of the priority locations and determined the most appropriate recovery technology. Information included site layout, areal extent, depth to water, sediment thickness, sediment bed type, data collected, habitat description and habitat quality, containment measures, access, and recommendations.
- Pre- and Post- Submerged Oil Recovery Figures
 - Presents qualitative pre- and post- poling data in a graphical format.
- Photographs
 - Provides visual documentation of pre- and post- submerge oil recovery activities.

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 9-27-2010

EPA(REP): Justin Parks/Brennan Pierce

ENBRIDGE(REP): Dave Murphy/Mike Blevin

LOCATION
(Division/Sect/MP)

MP 26.00

CLEANUP METHODS USED

Method: aeration Notes: two cells; E1, C4, 4 passes

Method: Water flush Notes: Water washed red cells,

Method: raking Notes: Raked red cells

OIL COLLECTION METHODS USED

Method: Sorbent pads---collected light sheen as it appeared

Method: .

DISCERNABLE OIL

OBSERVED (end of day) Very light sheen

Sheen(heavy, medium, **light**) Very, light-cell C4 Globules no

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): **YES**

Team Lead: Dave Murphy

Remediation Complete

SITE APPROVAL

Name

Signature

Date

EPA:

CARL R. GREGG

Enbridge:

Scott Sweet #490

Justin Parks
Scott Sweet

10/6/10

10/6/2010

MP 26.00

10/1/10 @ 1040

light sheen observed in cells C4-C1, D4-D1. No tarballs or globules were liberated when sediment was disturbed in those areas.

No sheen or tarballs were observed in any of the "A" or "B" cells when disturbed using the air boat and paddle. C1, D, & E cells need additional work to recover removable oil.

- Site not cleaned

CRP

10/3/10 @ 1450

entered area w/ airboat. no globules or tarballs noted.

However, site still has enough sheen to be removable.

Not cleared. Recommend removing contaminated sorbent & rechecking.

10/6/10 @ 1115

Entered area in rows 1 & 2 to stir up sediment. No tarballs observed.

only very very small areas of light sheen / trace sheen. Not removable.

All clear

CRP

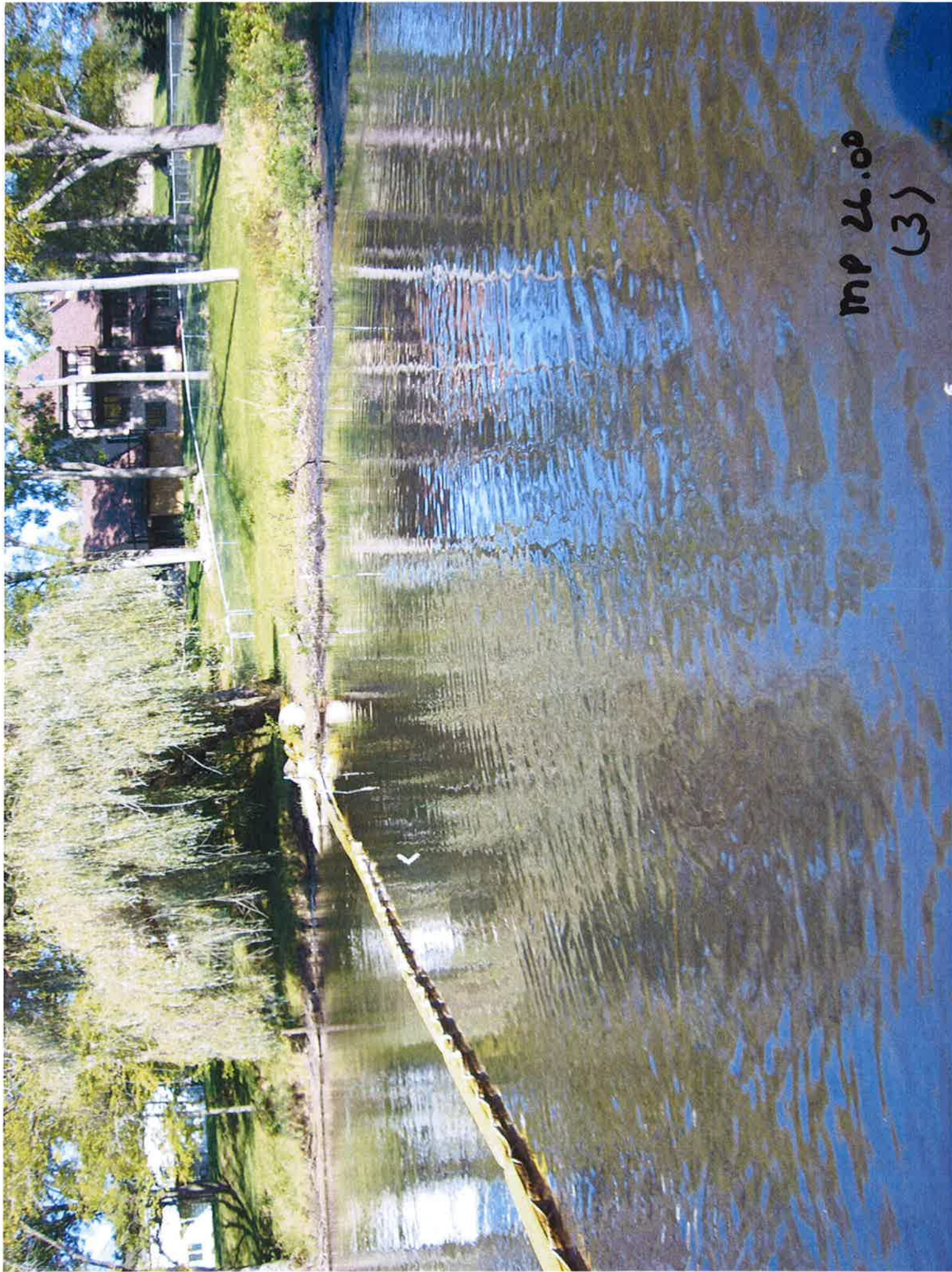


MP 26.00
(11)



(2)
00.72 AU

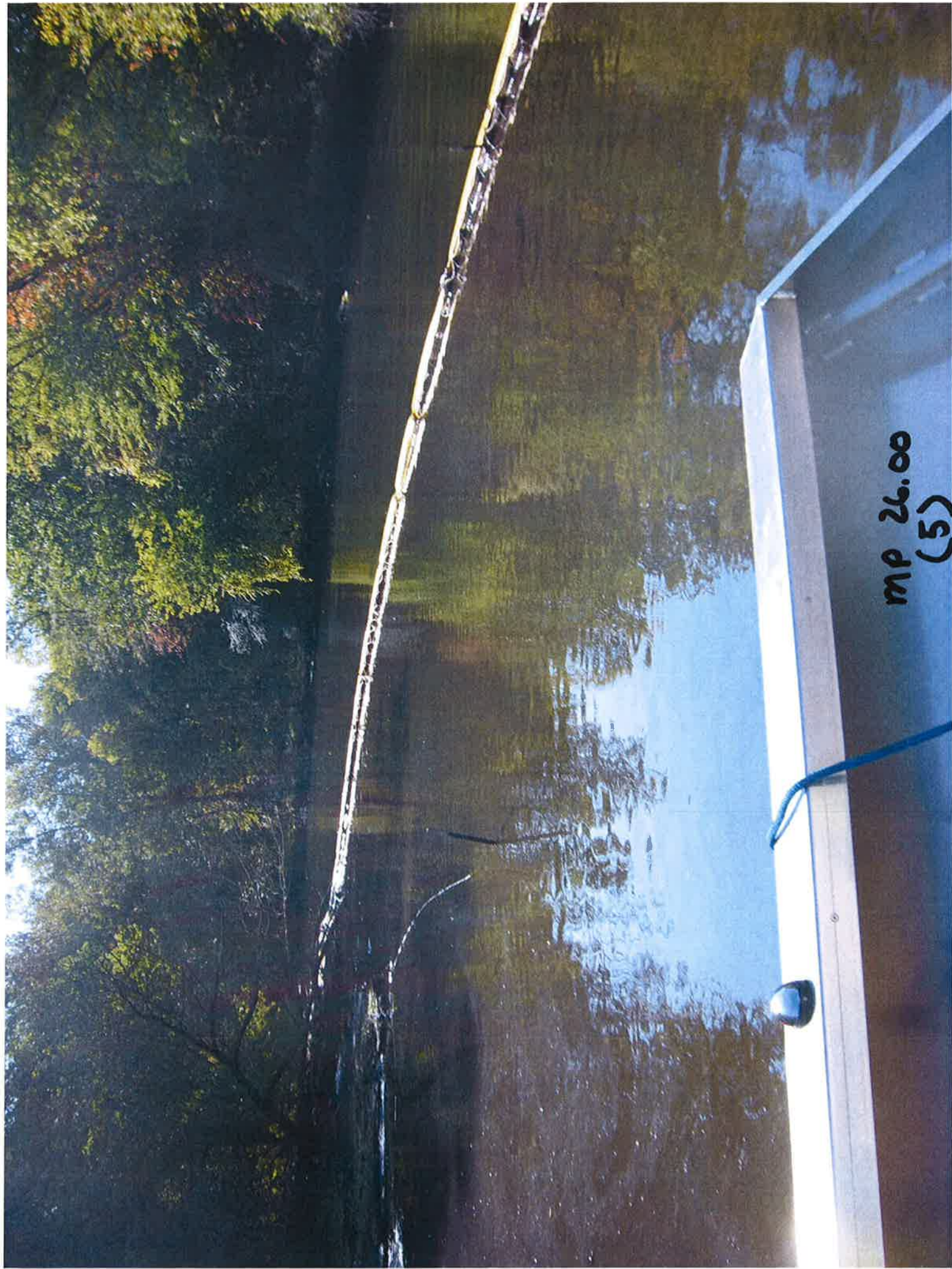




MP 26.00
(3)

mp 26.00
(4)



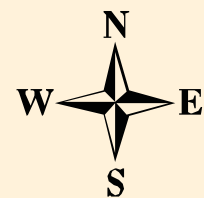


mp 26.00
(5)

SITE SUMMARY – MP 26.00

The information provided below shall be used by the field teams to better understand site specific characteristics of the priority locations and determine the most appropriate recovery technology.

Site Location:	MP 26.00
Site Layout:	See Figure Attached
Description and Geomorphic Setting:	Backwater pool on right side of river facing downstream.
Approximate Areal Extent:	~ 1 acre
Approximate Depth of Water:	< 2 feet
Sediment thickness:	1 to 1.5 feet
Bed type:	Soft sediment
Data Collected:	
Poling (Y/N)	Y
Cores (Y/N)	Y
Lab analysis (Y/N)	Y
Community Description and Habitat Quality:	Shallow backwater inlet about an acre in extent, surrounded by palustrine forest on two sides, and a residence on the third. A portion is mudflat. Water depth is 6 inches or less, overlying dark organic silt. Sparse vegetation; mostly purple loosestrife where any is present. Some refuge habitat for juvenile fish, but looks like anoxic conditions. Drift line of wood and trash created by owner. Some wood frog habitat toward the head of the inlet.
Containment:	400' 18" hard boom, 400' X-Tex
Access Issues:	Easy access
Miscellaneous:	N/A
Recommendations:	ECO: No major environmental concerns. This site could benefit from restoration/enhancement. Candidate mitigation site. SOTF: Recommend that reasonably aggressive steps be taken to remove the oil. The technique employed would rely primarily on aeration, but may also include sediment skimming, flushing, raking or a combination of these.



0 150 300
1 inch = 150 feet

Legend

Pre Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy
- Observed But Quantity Not Noted

Priority Areas

Submerged Oil Delineation Area

Priority Area Approximate Containment (if known)

Division Quarter Mile Grid

Poling Data Collected Through:
September 22, 2010

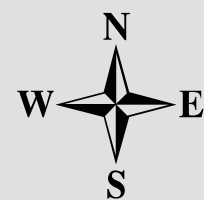
Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

PRIORITY AREA PRE RECOVERY QUALITATIVE RESULTS MP 26.0 and MP 26.25

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 25, 2010





0 150 300
1 inch = 150 feet

Legend

Post Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

**Poling Data Collected Through:
October 13, 2010**

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA POST RECOVERY
QUALITATIVE RESULTS
MP 26.0 and MP 26.25**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 26, 2010



TETRA TECH EC, INC.

PHOTOGRAPH LOG

Photograph 1

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
26.00

Date:
09/26/10

Description:
Recovery activities in
progress – water washing

View Direction:
Facing north



PHOTOGRAPH LOG

Photograph 2

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
26.00

Date:
09/26/10

Description:
Recovery activities in
progress - water washing

View Direction:
Facing west



PHOTOGRAPH LOG
Photograph 3

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
26.00

Date:
09/26/10

Description:
Recovery activities in
progress - water washing

View Direction:
Facing north

**PHOTOGRAPH LOG**
Photograph 4

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
26.00

Date:
09/26/10

Description:
Recovery activities in
progress - water washing

View Direction:
Facing west



PHOTOGRAPH LOG

Photograph 5

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
26.00

Date:
10/24/10

Description:
Post Recovery – Activities
complete and containment
removed

View Direction:
Facing southeast



PHOTOGRAPH LOG

Photograph 6

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
26.00

Date:
10/24/10

Description:
Post Recovery – Activities
complete and containment
removed

View Direction:
Facing northeast



**Enbridge Line 6B MP 608 Pipeline Release
Marshall, Michigan**

**Permanent Recovery of Submerged Oil and Oil-Contaminated
Sediments at Priority Locations**

**Submerged Oil Recovery Summary Report
Kalamazoo River MP 26.25 Cutoff Channel**

Enbridge Energy

EXECUTIVE SUMMARY

A Submerged Oil Task Force (SOTF) was created on Tuesday, August 24, 2010, to perform field assessment, characterization, and mapping of submerged oil impacts in surface water and sediments of Talmadge Creek, Kalamazoo River and Morrow Lake (Talmadge Creek to Kalamazoo River to River Mile Post [RMP] 40). The SOTF is comprised of representatives from the United States Environmental Protection Agency (USEPA), the Michigan Department of Natural Resources and the Environment (MDNRE), Stakeholders, Enbridge and their contractors.

As a result of the initial field assessments, 34 sites in the Kalamazoo River had been identified as potentially containing accumulations of significant amounts of submerged oil in river sediments. These areas were further investigated, and 18 were identified as high priority areas and were recommended for submerged oil recovery by the SOTF. These 18 priority areas were also subjected to an ecological habitat assessment intended to classify their ecological use and value to help guide cleanup operations. The SOTF discussed the assessment in conjunction with possible cleanup approaches, and in a September 21, 2010 memorandum the Task Force Leaders provided recommendations for oil removal for these 18 priority areas.

Initial Assessment

The Qualitative Assessment was a reconnaissance effort to identify areas with the presence of submerged oil, identify depositional areas, prioritize sites based on a relative comparison of impacted sites, and obtain information on the depositional and erosional characteristics of geomorphic settings in which the impacted sites were identified. This was accomplished by in-channel sediment poling, which consisted of inserting a graduated metal pole equipped with a foot disk, into the sediment and recording visual evidence of oil, sheen (light, moderate, or heavy), droplets, globules, and/or tar balls after the sediment was agitated. Each poling location was located by GPS, with the elevation of the water surface, depth of water, top of sediment, and depth of soft sediment recorded. The primary criterion for prioritizing sites for quantitative sampling was the visual presence of oil in the qualitative phase. These areas were identified by the Tetra Tech field scientists. Depositional areas of the river were mapped and targeted for sampling during the quantitative sampling program.

RMP 26.25 - (Cutoff Channel)

MP 26.25 is a small cove on the right side of the river facing downstream. MP 26.25 is a shallow cove about 1 acre in extent. Some sharp-stemmed bulrush on one side, but mostly the cove is open water with a narrow shoreline mudflat. Water depth is 1 foot or less, overlying soft sediment.

Actions

MP 26.25 was divided into 9 cells for oil recovery purposes (please refer to the sign-off sheet in the attachments for a sketch of the cell layout). Oil recovery activities ran from September 27, 2010 through October 5, 2010. The cells were aerated with a combination of pond aerators (cells 1, 2, and 3), flushing, water wands, and manual raking with workers walking in waders and working from boats. Three pumps were used to flush water, two pumps operated from the shoreline, and the third from a jon boat. Oil was collected by leaf blowers using absorbent boom and pads and hand held skimmers. The absorbent boom was replaced a number of times due to oiling. On October 5, 2010, priority site MP 21.5 was recommended for final sign-off.

Outcome

The site was visited by USEPA and Enbridge representatives on October 6 and 14, 2010. The USEPA and Enbridge representatives entered the site via airboat and disturbed sediment throughout the cells. On October 6, 2010, no discernable oil was noted for cells 1, 2, and 3, no tar balls only occasional areas of trace sheen, cells 1, 2, and 3 were cleared. However, globules were observed in cells 4 through 9, which required additional remedial action. Cells 4 through 9 needed additional work to recover removable oil.

On October 14, 2010, the site was revisited by USEPA and Enbridge representatives; no discernable oil was observed. All of site MP 26.25 was cleared and received final sign-off.

Attachment Descriptions

The ensuing information listed below directly follows in this Submerged Oil Recovery Summary Report:

- USEPA and Enbridge signed Submerged Oil Remediation Status Tracking Form.
 - Contains signatory approvals.
- Site Summary
 - Provides information used by the field teams to better understand site specific characteristics of the priority locations and determined the most appropriate recovery technology. Information included site layout, areal extent, depth to water, sediment thickness, sediment bed type, data collected, habitat description and habitat quality, containment measures, access, and recommendations.
- Pre- and Post- Submerged Oil Recovery Figures
 - Presents qualitative pre- and post- poling data in a graphical format.
- Photographs
 - Provides visual documentation of pre- and post- submerge oil recovery activities.

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 10/14/10

EPA(Rep): Brennan Pierce

ENBRIDGE(Rep): Dave Murphy/Robert Suehs

LOCATION
(Division/Sect/MP)

MP 26.25-full site

CLEANUP METHODS USED

Method: aeration Notes: 3 cells (1,2,3)

Method: Water flush Notes: Water washed red cells, shallow areas, multiple passes

Method: raking Notes: Raked red cells, shallow areas, multiple passes

OIL COLLECTION METHODS USED

Method: Sorbent boom, Sorbent pads---

Method:

DISCERNABLE OIL OBSERVED (end of day) Cells 1-3-no discernable oil (10/6) Shallow areas, cells 4-9 no discernable oil (10/14):

Sheen(heavy, medium, light)

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): **Yes: all cells**

Team Lead: Dave Murphy

Remediation Complete
SITE APPROVAL

Name

Signature

Date

EPA:

PAUL R. PERONARD

[Signature]

10/15/2010

Enbridge:

Joe Kackos

[Signature]

10/15/2010



Legend

Approximate Containment (unverified)

SOTF Priority Sites

Estimated Areas of Highest Impact

Priority Area 1

Priority Area 2

Priority Area 3

26.25

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 10-5-2010

EPA(REP): Brennan Pierce

ENBRIDGE(REP): Dave Murphy/Robert Suehs

LOCATION
(Division/Sect/MP)

MP 26.25

CLEANUP METHODS USED

Method: aeration Notes: 3 cells (1,2,3)

Method: Water flush Notes: Water washed red cells, shallow areas, multiple passes

Method: raking Notes: Raked red cells, shallow areas, multiple passes

OIL COLLECTION METHODS USED

Method: Sorbent pads---

Method:

DISCERNABLE OIL
OBSERVED (end of day)

Cells 1-3-no
discernable oil

Shallow areas, cells 4-9: oil
still present

Sheen(heavy, medium, light)

No oil in cells 1-3
Yes cells 4-9

Globules yes cells 4-9

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): **Yes: cells 1-3 only;** recommend remainder of site (cells 4-9) be transferred to O&M

Team Lead: Dave Murphy

Remediation Complete
SITE APPROVAL

Name

Signature

Date

EPA:

CARL PELLEGRINO

Enbridge:

Scott Swiech

[Signature]
[Signature]

10/6/10

10/6/2010



26.25

10/1/2010

MP 26.25

(1)



mp 26.25
(3)



mp 26.25
(3)



mp 26.25
(4)



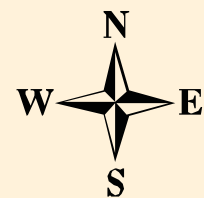
NP 26-25
(5)



SITE SUMMARY – MP 26.25

The information provided below shall be used by the field teams to better understand site specific characteristics of the priority locations and determine the most appropriate recovery technology.

Site Location:	MP 26.25
Site Layout:	See Figure Attached
Description and Geomorphic Setting:	Small cove on the right side of the bank looking downstream.
Approximate Areal Extent:	~ 1 acre
Approximate Depth of Water:	< 1 foot
Sediment thickness:	1 foot
Bed type:	Soft sediment
Data Collected:	
Poling (Y/N)	Y
Cores (Y/N)	Y
Lab analysis (Y/N)	Y
Community Description and Habitat Quality:	Shallow cove about 0.75 acre in extent. Some sharp-stemmed bulrush on one side, but most is open water about 12 inches deep over silt. Coarse woody debris present. Narrow shoreline mudflat with spotted sandpiper foraging on it. Mudflat in the middle about 50x100 ft in extent. Refuge habitat for juvenile fish; hundreds of small fish about a half inch in size. Some concrete on shoreline. Riparian forest surrounds on three sides.
Containment:	300' 18" hard boom, 300' X-Text curtain
Access Issues:	Easy to moderate
Miscellaneous:	N/A
Recommendations:	ECO: Not a major environmental concern. Future oil extraction efforts should keep the area shallow. Potential candidate mitigation site for enhancement. SOTF: Recommend that reasonably aggressive steps be taken to remove the oil. The technique employed would rely primarily on aeration, but may also include sediment skimming, flushing, raking or a combination of these.



0 150 300
1 inch = 150 feet

Legend

Pre Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy
- Observed But Quantity Not Noted

Priority Areas

Submerged Oil Delineation Area

Priority Area Approximate Containment (if known)

Division Quarter Mile Grid

**Poling Data Collected Through:
September 22, 2010**

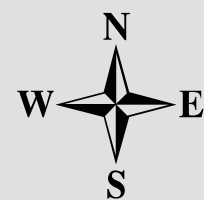
Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA PRE RECOVERY
QUALITATIVE RESULTS
MP 26.0 and MP 26.25**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 25, 2010





0 150 300
1 inch = 150 feet

Legend

Post Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

**Poling Data Collected Through:
October 13, 2010**

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA POST RECOVERY
QUALITATIVE RESULTS
MP 26.0 and MP 26.25**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 26, 2010



TETRA TECH EC, INC.

PHOTOGRAPH LOG

Photograph 1

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
26.25

Date:
09/27/10

Description:
Recovery activities in
progress - water washing

View Direction:
Facing north



PHOTOGRAPH LOG

Photograph 2

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
26.25

Date:
09/26/10

Description:
Recovery activities in
progress – collecting
surfaced oil with pads

View Direction:
Facing west



PHOTOGRAPH LOG
Photograph 3

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
26.25

Date:
09/27/10

Description:
Recovery activities in
progress - water washing

View Direction:
Facing north

**PHOTOGRAPH LOG**
Photograph 4

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
26.25

Date:
09/26/10

Description:
Recovery activities in
progress – collecting
surfaced oil with pads

View Direction:
Facing west



PHOTOGRAPH LOG
Photograph 5

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
26.25

Date:
10/24/10

Description:
Post Recovery – Recovery
activities complete – some
containment still in place

View Direction:
Facing northeast

**PHOTOGRAPH LOG**
Photograph 6

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
26.25

Date:
10/24/10

Description:
Post Recovery – Recovery
activities complete – some
containment still in place

View Direction:
Facing northwest



**Enbridge Line 6B MP 608 Pipeline Release
Marshall, Michigan**

**Permanent Recovery of Submerged Oil and Oil-Contaminated
Sediments at Priority Locations**

**Submerged Oil Recovery Summary Report
Kalamazoo River MP 26.65 Cove**

Enbridge Energy

EXECUTIVE SUMMARY

A Submerged Oil Task Force (SOTF) was created on Tuesday, August 24, 2010, to perform field assessment, characterization, and mapping of submerged oil impacts in surface water and sediments of Talmadge Creek, Kalamazoo River and Morrow Lake (Talmadge Creek to Kalamazoo River to River Mile Post [RMP] 40). The SOTF is comprised of representatives from the United States Environmental Protection Agency (USEPA), the Michigan Department of Natural Resources and the Environment (MDNRE), Stakeholders, Enbridge and their contractors.

As a result of the initial field assessments, 34 sites in the Kalamazoo River had been identified as potentially containing accumulations of significant amounts of submerged oil in river sediments. These areas were further investigated, and 18 were identified as high priority areas and were recommended for submerged oil recovery by the SOTF. These 18 priority areas were also subjected to an ecological habitat assessment intended to classify their ecological use and value to help guide cleanup operations. The SOTF discussed the assessment in conjunction with possible cleanup approaches, and in a September 21, 2010 memorandum the Task Force Leaders provided recommendations for oil removal for these 18 priority areas.

Initial Assessment

The Qualitative Assessment was a reconnaissance effort to identify areas with the presence of submerged oil, identify depositional areas, prioritize sites based on a relative comparison of impacted sites, and obtain information on the depositional and erosional characteristics of geomorphic settings in which the impacted sites were identified. This was accomplished by in-channel sediment poling, which consisted of inserting a graduated metal pole equipped with a foot disk, into the sediment and recording visual evidence of oil, sheen (light, moderate, or heavy), droplets, globules, and/or tar balls after the sediment was agitated. Each poling location was located by GPS, with the elevation of the water surface, depth of water, top of sediment, and depth of soft sediment recorded. The primary criterion for prioritizing sites for quantitative sampling was the visual presence of oil in the qualitative phase. These areas were identified by the Tetra Tech field scientists. Depositional areas of the river were mapped and targeted for sampling during the quantitative sampling program.

RMP 26.65 - (Cove)

MP 26.65 is a small cove area on the right side of the river facing downstream. MP 26.65 is a shallow cove about 0.5 acres in extent. The cove area is surrounded by palustrine forest wetland on two sides and residences on another. This area is mostly a mudflat, with a small amount of open water on the river side abutting the former boom. The water depth is 0.5 feet with approximately 1.5 feet of soft sediment.

Actions

MP 26.65 was divided into 9 cells for oil recovery purposes (please refer to the sign-off sheet in the enclosed attachments for a sketch of the cell layout). Oil recovery activities ran from September 21, 2010 through September 27, 2010. The cells were aerated with a combination of pond aerators (3 cells), flushing with water wands, and manual raking. All cells were flushed and cell B2 received an additional second flushing. Oil was collected by absorbent boom and pads. The absorbent boom was replaced when recovery efforts were completed. On September 27, 2010, priority site MP 21.5 was recommended for final sign-off.

Outcome

The site was visited by USEPA and Enbridge representatives on October 1 and 3, 2010. The USEPA and Enbridge representatives entered the site via airboat and disturbed sediment throughout the cells. On October 1, 2010, surface sheen was observed throughout cells A1 through E2. Disturbing sediment did not liberate tar balls or globules. However, the sheen was recoverable; therefore the site was not cleared.

On October 3, 2010, the site was revisited by USEPA and Enbridge representatives. They entered the cells by airboat and disturbed the sediment with a pole. No discernable oil, tar balls, or globules were noted; only a slight sheen was noted. Site MP 26.65 was cleared and received final sign-off.

Attachment Descriptions

The ensuing information listed below directly follows in this Submerged Oil Recovery Summary Report:

- USEPA and Enbridge signed Submerged Oil Remediation Status Tracking Form.
 - Contains signatory approvals.
- Site Summary
 - Provides information used by the field teams to better understand site specific characteristics of the priority locations and determined the most appropriate recovery technology. Information included site layout, areal extent, depth to water, sediment thickness, sediment bed type, data collected, habitat description and habitat quality, containment measures, access, and recommendations.
- Pre- and Post- Submerged Oil Recovery Figures
 - Presents qualitative pre- and post- poling data in a graphical format.
- Photographs
 - Provides visual documentation of pre- and post- submerge oil recovery activities.

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 9-27-2010

EPA(REP): Amanda Takac's/Brian Patterson #

ENBRIDGE(REP): John Maffeo

LOCATION
(Division/Sect/MP) MP 26.65

CLEANUP METHODS USED

Method: Aeration Notes: 3 cells

Method: Water flush Notes: All cells, cell B2 second flush

Method: Notes:

OIL COLLECTION METHODS USED

Method: Sorbent pads---collected light sheen as it appeared

Method: replaced sorbent boom when recovery activities stopped

DISCERNABLE OIL
OBSERVED (end of day) no

Sheen(heavy, medium, light) no Globules no

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): YES

Team Lead: John Maffeo

Remediation Complete
SITE APPROVAL

Name

Signature

Date

EPA: CARL PALLAGRINO

Enbridge: Scott Swiech #490

10/3/10

10/3/2010

10/1/10 @ 1015

- Light surface sheen observed throughout many areas of cells ~~the~~ from E2 through A1.

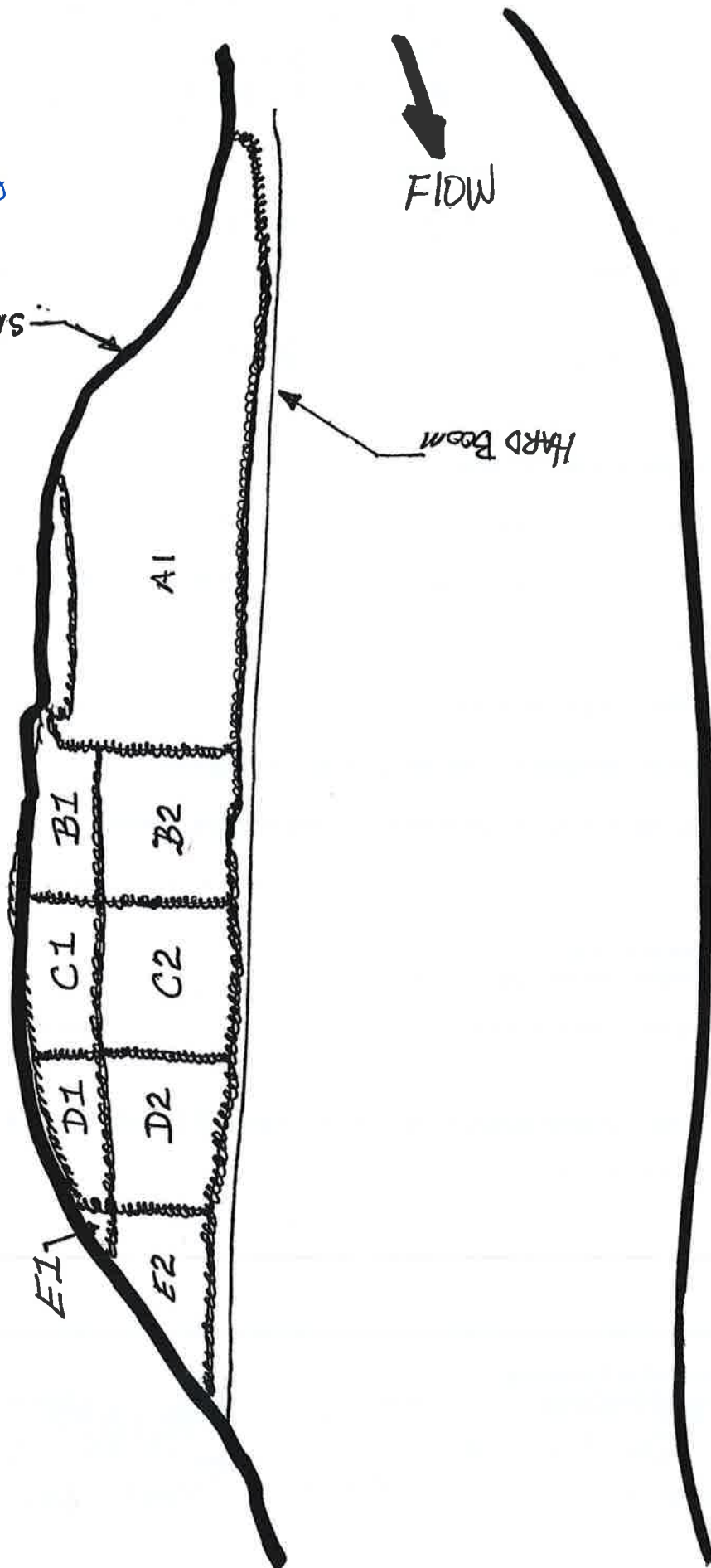
Disturbing sediment ^{trawling} did not liberate any tarballs or globules.

- Area needs to be cleaned of recoverable sheen and reinspected
- Site not cleaned

10/3/10 @ 1430

- entered boomed area w/ airboat & disturbed sediment w/ pole. No tar balls or globules noted site only has slight sheen.

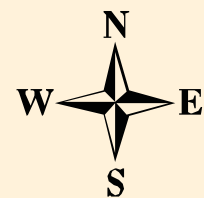
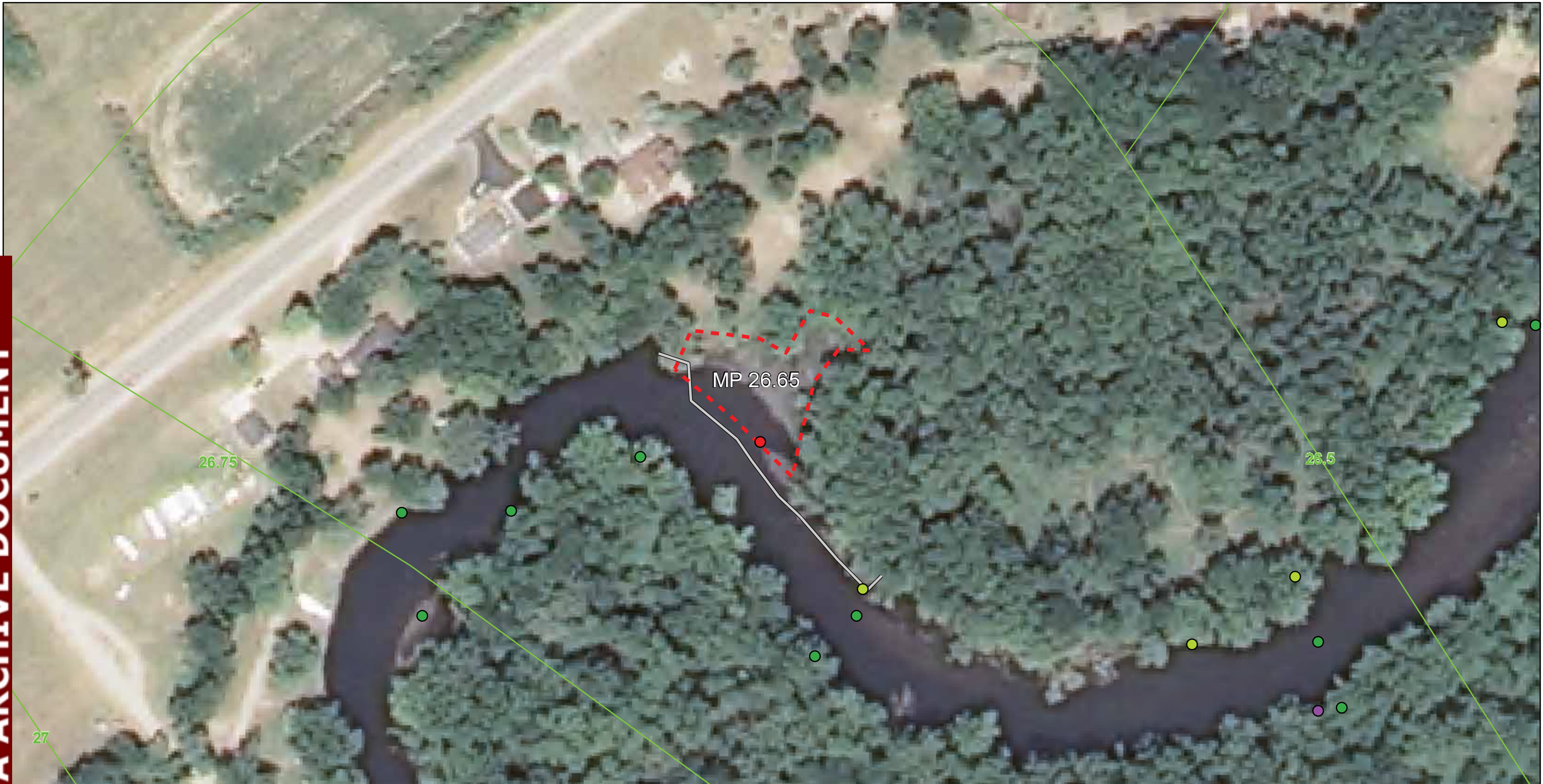
MP-26.65



SITE SUMMARY – MP 26.65

The information provided below shall be used by the field teams to better understand site specific characteristics of the priority locations and determine the most appropriate recovery technology.

Site Location:	MP 26.65
Site Layout:	See Figure Attached
Description and Geomorphic Setting:	Cove area on the right side, outside of the curve, looking downstream.
Approximate Areal Extent:	0.5 acres
Approximate Depth of Water:	0.5 feet
Sediment thickness:	1.5 feet
Bed type:	Soft sediment
Data Collected:	
Poling (Y/N)	Y
Cores (Y/N)	Y
Lab analysis (Y/N)	Y
Community Description and Habitat Quality:	Cove area surrounded by palustrine forest wetland on two sides and residences on another. This area is mostly a mudflat, with a small amount of open water on the river side abutting the existing boom. Water depth is 0-6 inches. Twenty-foot wide margin of emergent vegetation (<i>Peltandra</i> , <i>Pontedaria</i> , <i>Sagittaria</i>), with some purple loosestrife on mudflat on the river side. Nearby wet meadow located above the bank has high floristic diversity. Not much fish habitat under normal flow conditions.
Containment:	400' 18" hard boom, 350' X-Tex
Access Issues:	Easy
Miscellaneous:	Heavy vegetation
Recommendations:	ECO: Environmental concerns limited to the narrow margin of emergent vegetation, which should be avoided during submerged oil clean-up activities. Nearby wet meadow should be avoided if this area is accessed via over land. SOTF: Recommend that reasonably aggressive steps be taken to remove the oil. The technique employed would rely primarily on aeration, but may also include sediment skimming, flushing, raking or a combination of these.



0 100 200
1 inch = 100 feet

Legend

Pre Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy
- Observed But Quantity Not Noted



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

**Poling Data Collected Through:
September 11, 2010**

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

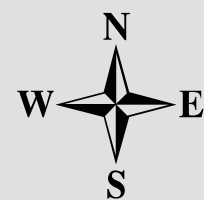
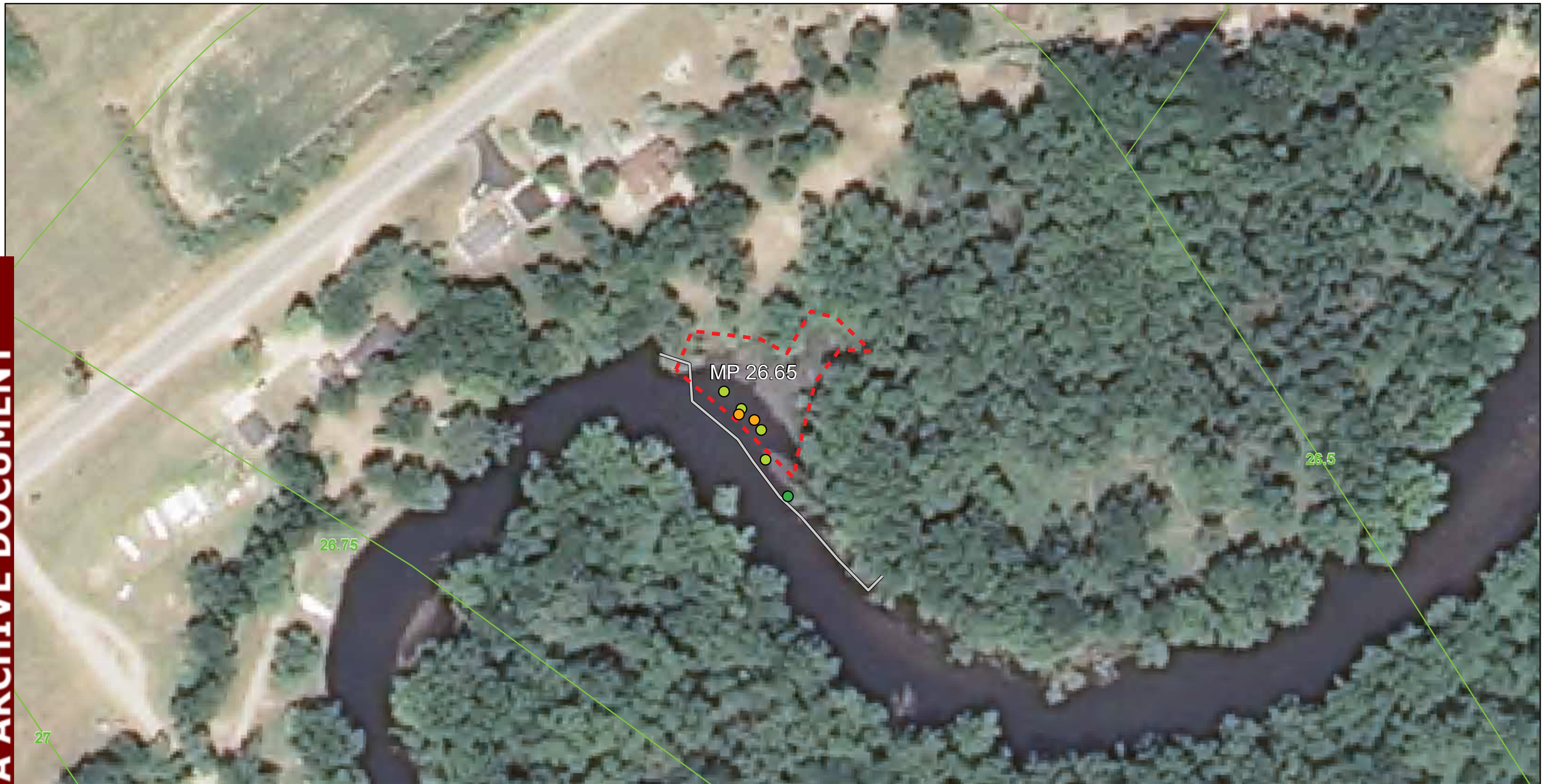
**PRIORITY AREA PRE RECOVERY
QUALITATIVE RESULTS
MP 26.65**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 25, 2010



TETRA TECH EC, INC.



0 100 200

1 inch = 100 feet

Legend

Post Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

**Poling Data Collected Through:
October 13, 2010**

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA POST RECOVERY
QUALITATIVE RESULTS
MP 26.65**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 26, 2010



TETRA TECH EC, INC.

PHOTOGRAPH LOG

Photograph 1

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
26.65

Date:
09/27/10

Description:
Recovery activities in
progress – cells prepared

View Direction:
Facing northeast



PHOTOGRAPH LOG

Photograph 2

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
26.65

Date:
09/27/10

Description:
Recovery activities in
progress - aeration

View Direction:
Facing northwest



PHOTOGRAPH LOG

Photograph 3

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
26.65

Date:
09/27/10

Description:
Recovery activities in
progress - aeration

View Direction:
Facing east



PHOTOGRAPH LOG

Photograph 4

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
26.65

Date:
9/27/10

Description:
Recovery activities in
progress – cells prepared

View Direction:
Facing north



PHOTOGRAPH LOG
Photograph 5

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
26.65

Date:
10/24/10

Description:
Post Recovery – Recovery
activities complete and
containment removed

View Direction:
Facing northwest

**PHOTOGRAPH LOG**
Photograph 6

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
26.65

Date:
10/24/10

Description:
Post Recovery – Recovery
activities complete and
containment removed

View Direction:
Facing northwest



PHOTOGRAPH LOG

Photograph 7

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
26.65

Date:
10/24/10

Description:
Post Recovery – Recovery
activities complete and
containment removed

View Direction:
Facing northeast



PHOTOGRAPH LOG

Photograph 8

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
26.65

Date:
10/24/10

Description:
Post Recovery – Recovery
activities complete and
containment removed

View Direction:
Facing northwest



**Enbridge Line 6B MP 608 Pipeline Release
Marshall, Michigan**

**Permanent Recovery of Submerged Oil and Oil-Contaminated
Sediments at Priority Locations**

**Submerged Oil Recovery Summary Report
Kalamazoo River MP 27.9 Meander with Depositional Bar**

Enbridge Energy

EXECUTIVE SUMMARY

A Submerged Oil Task Force (SOTF) was created on Tuesday, August 24, 2010, to perform field assessment, characterization, and mapping of submerged oil impacts in surface water and sediments of Talmadge Creek, Kalamazoo River and Morrow Lake (Talmadge Creek to Kalamazoo River to River Mile Post [RMP] 40). The SOTF is comprised of representatives from the United States Environmental Protection Agency (USEPA), the Michigan Department of Natural Resources and the Environment (MDNRE), Stakeholders, Enbridge and their contractors.

As a result of the initial field assessments, 34 sites in the Kalamazoo River had been identified as potentially containing accumulations of significant amounts of submerged oil in river sediments. These areas were further investigated, and 18 were identified as high priority areas and were recommended for submerged oil recovery by the SOTF. These 18 priority areas were also subjected to an ecological habitat assessment intended to classify their ecological use and value to help guide cleanup operations. The SOTF discussed the assessment in conjunction with possible cleanup approaches, and in a September 21, 2010 memorandum the Task Force Leaders provided recommendations for oil removal for these 18 priority areas.

Initial Assessment

The Qualitative Assessment was a reconnaissance effort to quickly identify areas with the presence of submerged oil, identify depositional areas, prioritize sites based on a relative comparison of impacted sites, and obtain information on the depositional / erosional characteristics of geomorphic settings in which the impacted sites were identified. This was accomplished by an initial visual assessment followed by in-channel sediment poling, which consisted of inserting a graduated metal pole equipped with a foot disk, into the sediment and recording visual evidence of oil, sheen (light, moderate, or heavy), droplets, globules, and/or tar balls after the sediment was agitated. Each poling location was located by GPS, with the elevation of the water surface, depth of water, top of sediment, and depth of soft sediment recorded. Both the visual assessment and the poling results were documented in field logs. The qualitative poling results of RMP 27.9 was not indicative of the visual field observations made that warranted this site to be designated as a priority site. The primary criterion for prioritizing sites for quantitative sampling was the visual presence of oil in the qualitative phase. These areas were identified by the Tetra Tech field scientists. Depositional areas of the river were mapped and targeted for sampling during the quantitative sampling program.

RMP 27.9 - (Meander with Depositional Bar)

MP 27.9 is a small meander with a depositional bar; mudflat area on right side looking downstream. MP 27.9 is a shallow cove about 0.75 acres in extent. The unvegetated mudflat has a narrow scattered fringe of willows abruptly transitioning to a wetland forest dominated by mature silver maple. The water depth is 0.5 feet with approximately 0 to 1 feet of soft sediment.

Actions

MP 27.9 was divided into 14 cells for oil recovery purposes (please refer to the sign-off sheet in the attachments for a sketch of the cell layout). Oil recovery activities ran through September 24, 2010. The cells were aerated by water flushing. Raking was attempted, but aborted due to the depth of the sediments. All cells were flushed. Oil was collected by absorbent boom and

pads as the light sheen appeared. On September 24, 2010, priority site MP 27.9 was recommended for final sign-off.

Outcome

The site was visited by USEPA and Enbridge representatives on October 1, 2010. The USEPA and Enbridge representatives entered the "B" row of cells the site via airboat and disturbed sediment throughout the cells; no sheen, tar balls, or discernable oil was noted. The USEPA and Enbridge representatives did not enter the "A" row of cells because this area was above the water line and supporting terrestrial vegetation had taken root. Site MP 27.9 was cleared and received final sign-off.

Attachment Descriptions

The ensuing information listed below directly follows in this Submerged Oil Recovery Summary Report:

- USEPA and Enbridge signed Submerged Oil Remediation Status Tracking Form.
 - Contains signatory approvals.
- Site Summary
 - Provides information used by the field teams to better understand site specific characteristics of the priority locations and determined the most appropriate recovery technology. Information included site layout, areal extent, depth to water, sediment thickness, sediment bed type, data collected, habitat description and habitat quality, containment measures, access, and recommendations.
- Pre- and Post- Submerged Oil Recovery Figures
 - Presents qualitative pre- and post- poling data in a graphical format.
- Photographs
 - Provides visual documentation of pre- and post- submerge oil recovery activities.

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 9-24-2010

EPA(REP): Justin Parks/Brennan Pierce

ENBRIDGE(REP): Dave Murphy

LOCATION
(Division/Sect/MP) **MP 27.90**

CLEANUP METHODS USED

Method: Water flushing Notes: All cells

Method: Raking Notes: Tried but aborted due to depth of mud

Method: _____ Notes: _____

OIL COLLECTION METHODS USED

Method: **Sorbent pads**---collected light sheen as it appeared

Method: _____

DISCERNABLE OIL
OBSERVED (end of day) Very light sheen

Sheen(heavy, medium, light) Very, very light Globules no

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): **YES**

Team Lead: Dave Murphy

Remediation Complete
SITE APPROVAL

Name

Signature

Date

EPA:

Enbridge:

Scott Sworch

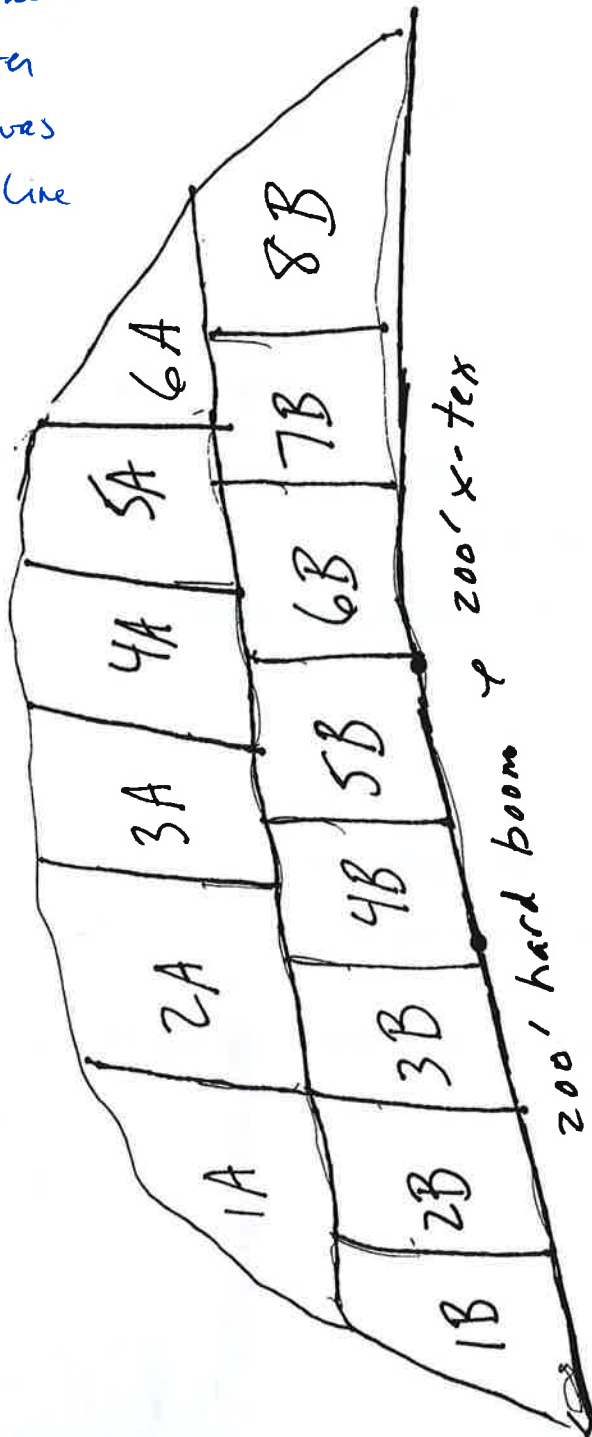
10/1/10

10/1/2010

10/1/10 @ 0950

entered all cells in "B"
row and disturbed sediment
w/ airboat & paddle.

Zero sheening or tarballs
observed. Did not enter
"A" zone as this ~~zone~~ was
filled in above the water line
and supporting terrestrial
vegetation which has
taken root

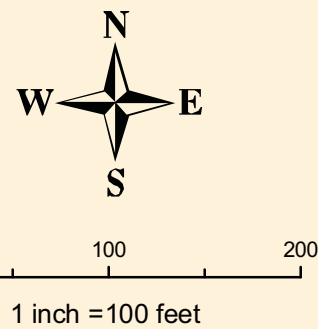
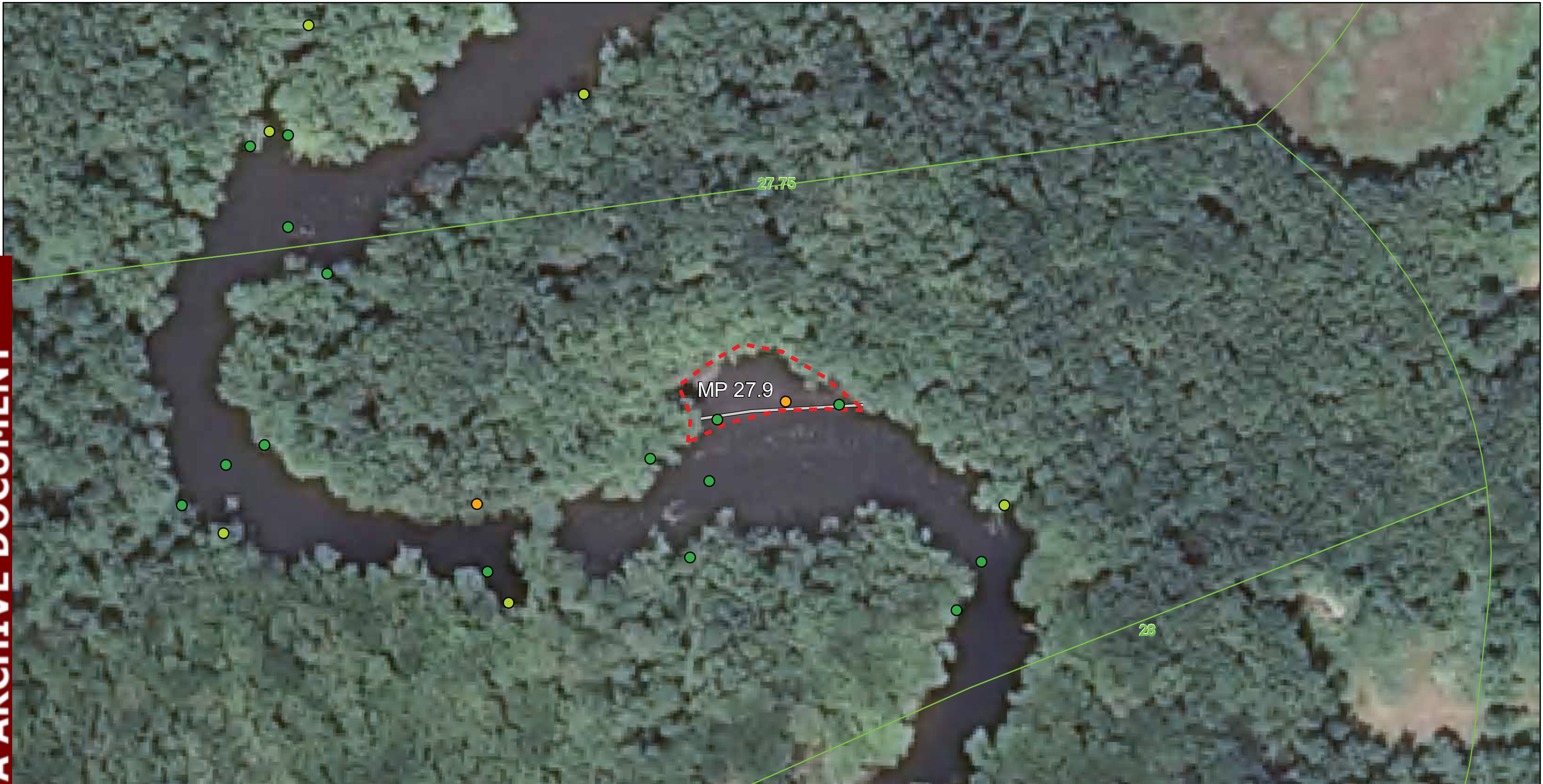


MP 27.9

SITE SUMMARY – MP 27.90

The information provided below shall be used by the field teams to better understand site specific characteristics of the priority locations and determine the most appropriate recovery technology.

Site Location:	MP 27.90
Site Layout:	See Figure Attached
Description and Geomorphic Setting:	Meander with depositional bar; mudflat area on right side looking downstream N42 20.467 W85 20.156
Approximate Areal Extent:	0.75 acres
Approximate Depth of Water:	0.5 feet
Sediment thickness:	0 to 1 feet
Bed type:	Soft sediment
Data Collected:	
Poling (Y/N)	Y
Cores (Y/N)	Y
Lab analysis (Y/N)	Y
Community Description and Habitat Quality:	Unvegetated mudflat; narrow scattered fringe of willows abruptly transitioning to palustrine forest dominated by mature silver maple. Fish noted in margins along the river's edge (juvenile largemouth bass and minnows).
Containment:	200' hard boom, 200' X-Tex
Access Issues:	Easy
Miscellaneous:	N/A
Recommendations:	ECO: No major environmental concerns. This area receives continual deposition of sediments, so spot dredging would be acceptable if required. SOTF: Recommend that reasonably aggressive steps be taken to remove the oil. The technique employed would rely primarily on aeration, but may also include sediment skimming, flushing, raking or a combination of these.



Legend

Pre Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy
- Observed But Quantity Not Noted

Priority Areas

Submerged Oil Delineation Area

Priority Area Approximate Containment (if known)

Division Quarter Mile Grid

**Poling Data Collected Through:
September 23, 2010**

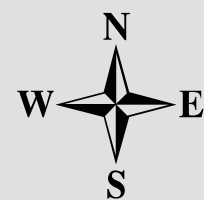
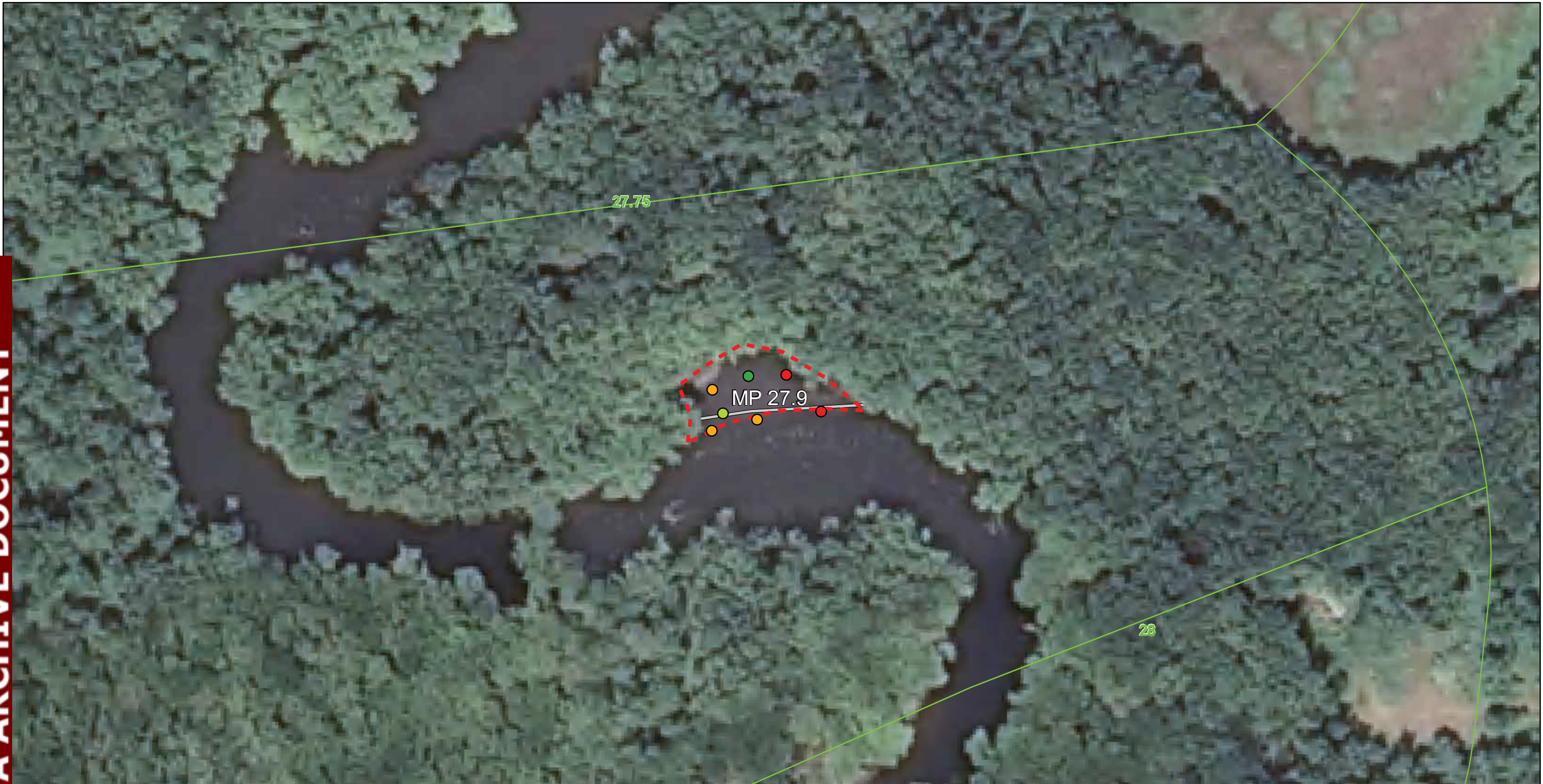
Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA PRE RECOVERY
QUALITATIVE RESULTS
MP 27.9**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 25, 2010





0 100 200
1 inch = 100 feet

Legend

Post Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

**Poling Data Collected Through:
October 14, 2010**

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA POST RECOVERY
QUALITATIVE RESULTS
MP 27.9**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 26, 2010



TETRA TECH EC, INC.

PHOTOGRAPH LOG

Photograph 1

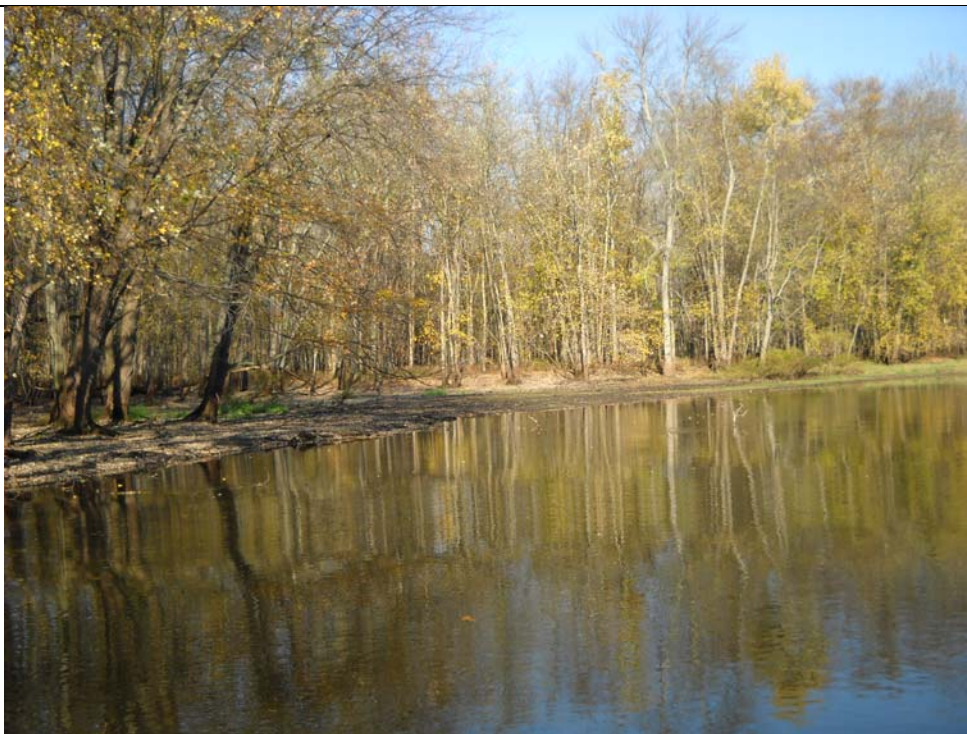
Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
27.9

Date:
10/24/10

Description:
Post recovery – recovery
activities complete and
containment removed

View Direction:
Facing northwest



PHOTOGRAPH LOG

Photograph 2

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
27.9

Date:
10/24/10

Description:
Post recovery – recovery
activities complete and
containment removed

View Direction:
Facing north



**Enbridge Line 6B MP 608 Pipeline Release
Marshall, Michigan**

**Permanent Recovery of Submerged Oil and Oil-Contaminated
Sediments at Priority Locations**

**Submerged Oil Recovery Summary Report
Kalamazoo River MP 28.25 Oxbow**

Enbridge Energy

EXECUTIVE SUMMARY

A Submerged Oil Task Force (SOTF) was created on Tuesday, August 24, 2010, to perform field assessment, characterization, and mapping of submerged oil impacts in surface water and sediments of Talmadge Creek, Kalamazoo River and Morrow Lake (Talmadge Creek to Kalamazoo River to River Mile Post [RMP] 40). The SOTF is comprised of representatives from the United States Environmental Protection Agency (USEPA), the Michigan Department of Natural Resources and the Environment (MDNRE), Stakeholders, Enbridge and their contractors.

As a result of the initial field assessments, 34 sites in the Kalamazoo River had been identified as potentially containing accumulations of significant amounts of submerged oil in river sediments. These areas were further investigated, and 18 were identified as high priority areas and were recommended for submerged oil recovery by the SOTF. These 18 priority areas were also subjected to an ecological habitat assessment intended to classify their ecological use and value to help guide cleanup operations. The SOTF discussed the assessment in conjunction with possible cleanup approaches, and in a September 21, 2010 memorandum the Task Force Leaders provided recommendations for oil removal for these 18 priority areas.

Initial Assessment

The Qualitative Assessment was a reconnaissance effort to identify areas with the presence of submerged oil, identify depositional areas, prioritize sites based on a relative comparison of impacted sites, and obtain information on the depositional and erosional characteristics of geomorphic settings in which the impacted sites were identified. This was accomplished by in-channel sediment poling, which consisted of inserting a graduated metal pole equipped with a foot disk, into the sediment and recording visual evidence of oil, sheen (light, moderate, or heavy), droplets, globules, and/or tar balls after the sediment was agitated. Each poling location was located by GPS, with the elevation of the water surface, depth of water, top of sediment, and depth of soft sediment recorded. The primary criterion for prioritizing sites for quantitative sampling was the visual presence of oil in the qualitative phase. These areas were identified by the Tetra Tech field scientists. Depositional areas of the river were mapped and targeted for sampling during the quantitative sampling program.

RMP 28.25 - (Oxbow)

MP 28.25 is an oxbow on the right side of the river looking downstream and about 1.5 acres in extent. The channel is inundated over approximately half its area, and the remainder is a dark brown mudflat. Areas that are inundated were reported as stagnant with little flow with a lot of woody debris in the water. The water depth is less than 1 foot with up to 2 feet of soft sediment overlying sand.

Actions

MP 28.25 was divided into 8 cells for oil recovery purposes (please refer to the sign-off sheet in the enclosed attachments for a sketch of the cell layout). Oil recovery activities ran from September 27, 2010 through October 5, 2010. The cells were aerated by a combination of pond aerators and water flushing. Due to the amount of downed brush in the water cells 1 through 8 were only partially aerated with the pond aerators. Three passes of water flushing in each cell was performed on September 26 and 27, 2010. In addition, raking was performed over the site. Oil was corralled with leaf blowers and collected by absorbent boom and pads as the light

sheen appeared. On October 5, 2010, priority site MP 28.25 was recommended for final sign-off.

Outcome

The site was visited by USEPA and Enbridge representatives on October 3 and 6, 2010. The USEPA and Enbridge representatives walked the outer bank of the oxbow disturbing sediments with a pole throughout. No evidence of submerged oil rising from the sediment disturbances. However, a light sheen was noted on the surface along the outer bank of the oxbow. USEPA recommended the removal of the sheen with absorbents, then the removal of the absorbent boom, followed by a recheck.

On October 6, 2010, the site was revisited by USEPA and Enbridge representatives. They walked along the bank and used sticks to disturb the sediments; no tar balls or sheen were observed. It was reported that the absorbent boom at the downstream edge of the oxbow was also free of sheen or oil globules. Site MP 28.25 was cleared and received final sign-off.

Attachment Descriptions

The ensuing information listed below directly follows in this Submerged Oil Recovery Summary Report:

- USEPA and Enbridge signed Submerged Oil Remediation Status Tracking Form.
 - Contains signatory approvals.
- Site Summary
 - Provides information used by the field teams to better understand site specific characteristics of the priority locations and determined the most appropriate recovery technology. Information included site layout, areal extent, depth to water, sediment thickness, sediment bed type, data collected, habitat description and habitat quality, containment measures, access, and recommendations.
- Pre- and Post- Submerged Oil Recovery Figures
 - Presents qualitative pre- and post- poling data in a graphical format.
- Photographs
 - Provides visual documentation of pre- and post- submerge oil recovery activities.

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 9-29-2010

EPA(REP): Justin Parks/Brennan Pierce

ENBRIDGE(REP): Dave Murphy

LOCATION
(Division/Sect/MP)

MP 28.25

CLEANUP METHODS USED

Method: aeration Notes: 8 cells partially aerated (due to amount of brush)

Method: flushing Notes: Multiple water flushes—3 passes 9/26-27.
Raking- over site

Method: raking Notes:

OIL COLLECTION METHODS USED

Method: **Sorbent pads**—collected light sheen with leaf blowers and pads —9/28

Method:

DISCERNABLE OIL
OBSERVED (end of day) Very light sheen

Sheen(heavy, medium, light) Very, very light Globules no

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): **YES**

Team Lead: Dave Murphy

Remediation Complete
SITE APPROVAL

Name

Signature

Date

EPA:

CHUCK
PELLERIN

10/6/2010

Enbridge:

Scott Surprenant 10/4/10

10/6/2010

200' boom

10/6/2010 @ 1035

Walked along bank and used stick to disturb sediment. no farballs or sheen observed.

Boom at downstream edge was also free of sheen or globules

All clear

(CP)

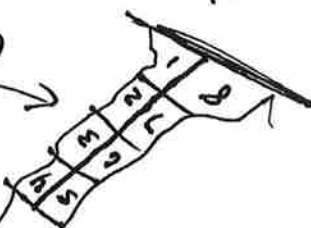
10/3/10 @ 1350 (Pellegrino)

Walked out from outer bank area, disturbing sediment w/pole throughout. no evidence of any submerged rising from test pokes.

However, a light sheen was noticed on surface along outer bank. Recommend sheen be removed, sorbents removed and area be rechecked.
Not cleared

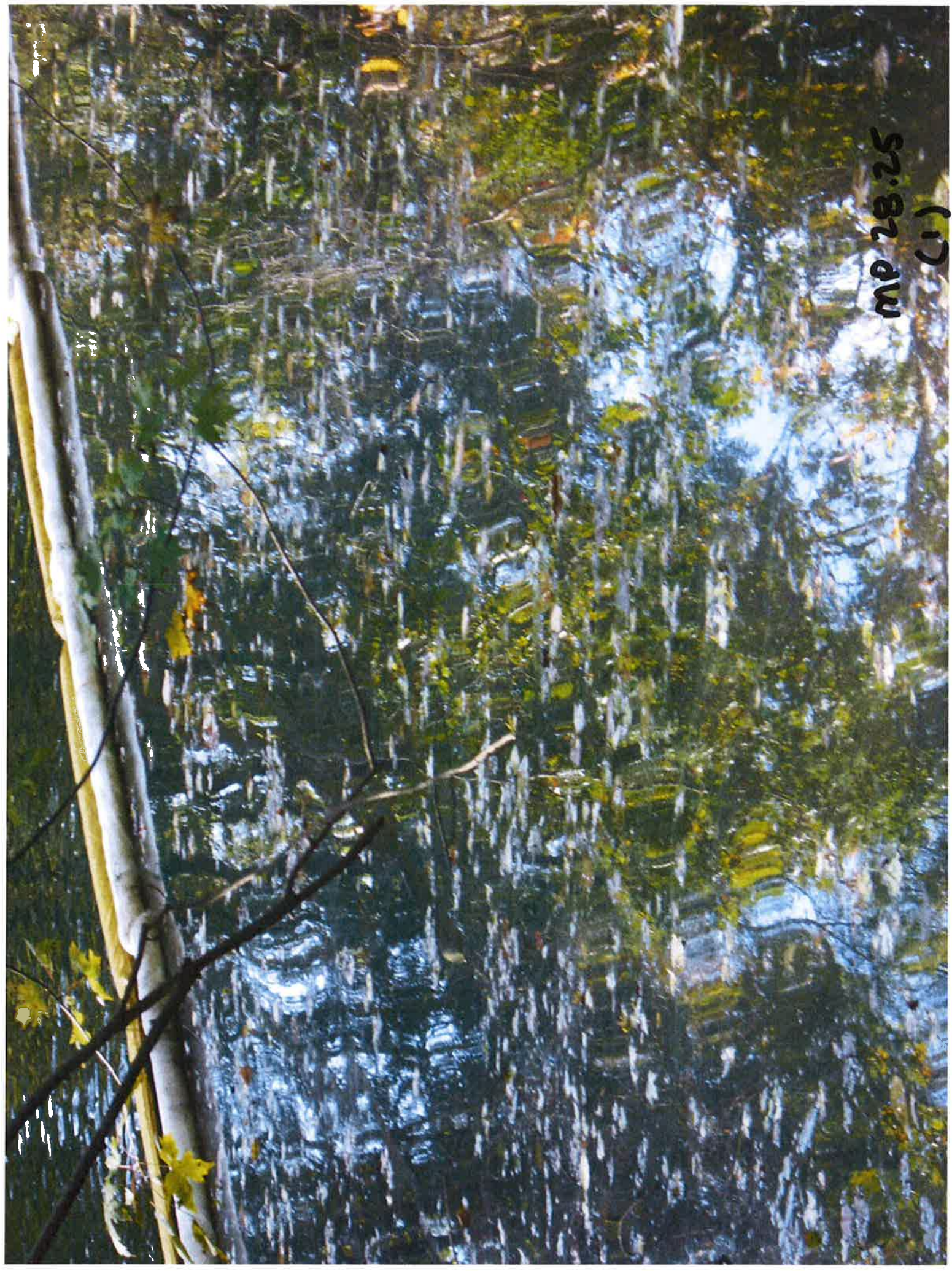
200' boom

Far field
Cells



MP 28.25

(1)



mp 2825
(2)



mp 28.25
(3)



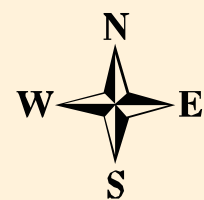


MP 28.25
(9)

SITE SUMMARY – MP 28.25

The information provided below shall be used by the field teams to better understand site specific characteristics of the priority locations and determine the most appropriate recovery technology.

Site Location:	MP 28.25
Site Layout:	See Figure Attached
Description and Geomorphic Setting:	Oxbow; deep channel with depositional area adjacent 42.20361, 85.20159 to 42.20282 to 85.20237
Approximate Areal Extent:	1.5 acres
Approximate Depth of Water:	< 1 foot
Sediment thickness:	Up to 2 feet
Bed type:	Soft sediment over sand
Data Collected:	
Poling (Y/N)	Y
Cores (Y/N)	Y
Lab analysis (Y/N)	Y
Community Description and Habitat Quality:	The channel is inundated over about half its area, and the remainder is dark brown mudflat. Areas that are inundated are currently stagnant with little flow. Some nursery and potential refuge habitat for fish. Also habitat for frogs and reptiles, but none seen. Adjacent palustrine forest is a high quality habitat that contains depressions. One is dominated by <i>Peltandra</i> , and the other is a wet meadow with high floristic diversity, including several rare or high quality native species (lizard-tail, false dragon's head, <i>Sium suave</i> and others).
Containment:	400' hard boom and X-Tex at south entrance, 200' each at north
Access Issues:	Difficult
Miscellaneous:	Heavy debris and oxbow
Recommendations:	ECO: No major environmental concerns associated with the oxbow channel itself – any impacts from dredging could be mitigated. Avoid disturbance to adjacent high quality palustrine forest and low areas within it. SOTF: Recommend that reasonably aggressive steps be taken to remove the oil. The technique employed would rely primarily on aeration, but may also include sediment skimming, flushing, raking or a combination of these.



0 100 200
1 inch = 100 feet

Legend

Pre Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy
- Observed But Quantity Not Noted

Priority Areas

Submerged Oil Delineation Area

Priority Area Approximate Containment (if known)

Division Quarter Mile Grid

**Poling Data Collected Through:
September 23, 2010**

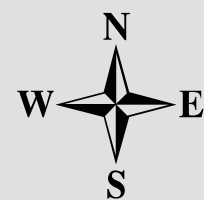
Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA PRE RECOVERY
QUALITATIVE RESULTS
MP 28.25**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 25, 2010





0 100 200
1 inch = 100 feet

Legend

Post Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

**Poling Data Collected Through:
October 7, 2010**

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA POST RECOVERY
QUALITATIVE RESULTS
MP 28.25**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 26, 2010



TETRA TECH EC, INC.

PHOTOGRAPH LOG
Photograph 1

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
28.25

Date:
10/05/10

Description:
Recovery activities in progress – using leaf blowers to collect oil

View Direction:
Facing north

**PHOTOGRAPH LOG**
Photograph 2

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
28.25

Date:
10/05/10

Description:
Recovery activities in progress – using leaf blowers to collect oil

View Direction:
Facing north



PHOTOGRAPH LOG
Photograph 3

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
28.25

Date:
10/05/10

Description:
Recovery activities in progress – using leaf blowers to collect oil

View Direction:
Facing south

**PHOTOGRAPH LOG**
Photograph 4

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
28.25

Date:
10/05/10

Description:
Recovery activities in progress – pads and boom deployed for oil collection

View Direction:
N/A



PHOTOGRAPH LOG
Photograph 5

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
28.25

Date:
10/24/10

Description:
Post recovery – recovery
activities complete

View Direction:
N/A

**PHOTOGRAPH LOG**
Photograph 6

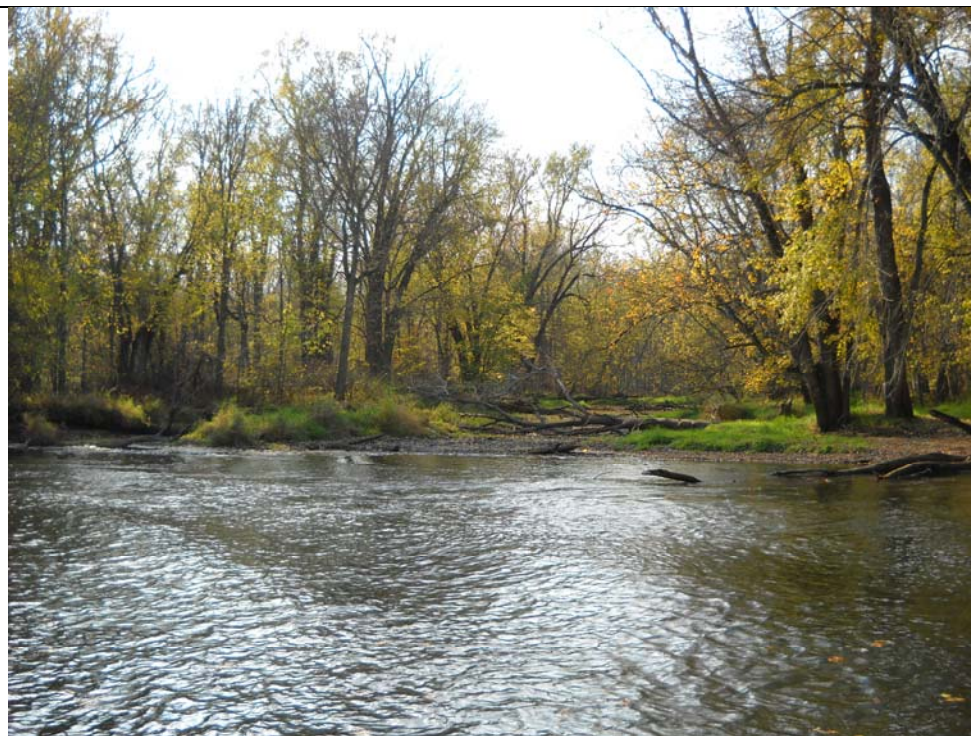
Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
28.25

Date:
10/24/10

Description:
Post recovery – recovery
activities complete

View Direction:



PHOTOGRAPH LOG
Photograph 7

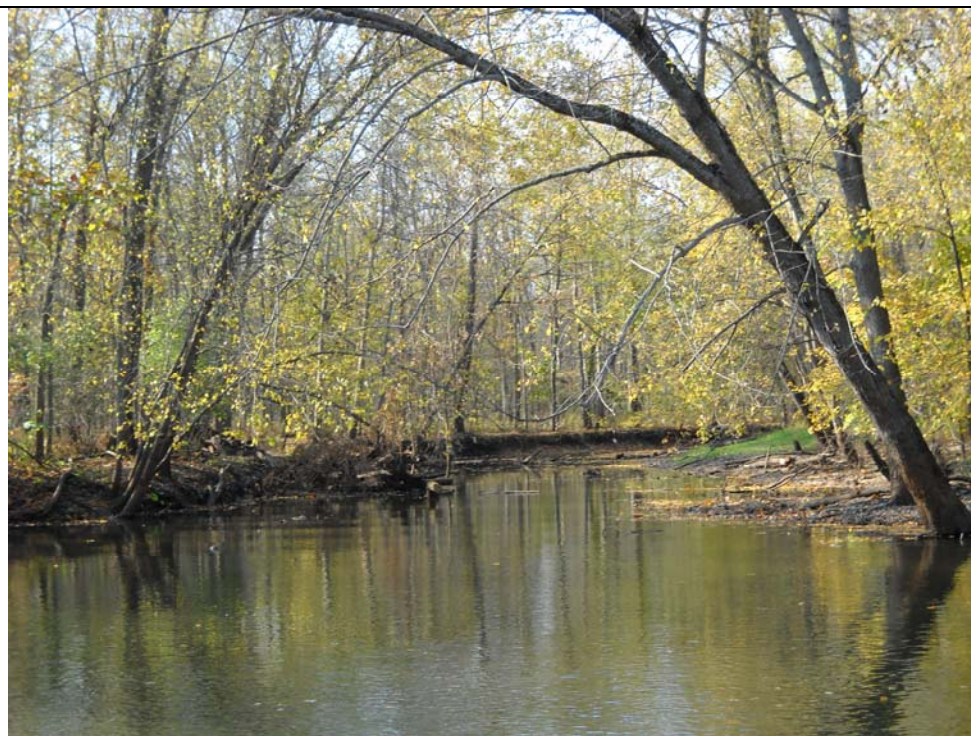
Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
28.25

Date:
10/24/10

Description:
Post recovery – recovery
activities complete

View Direction:
N/A

**PHOTOGRAPH LOG**
Photograph 8

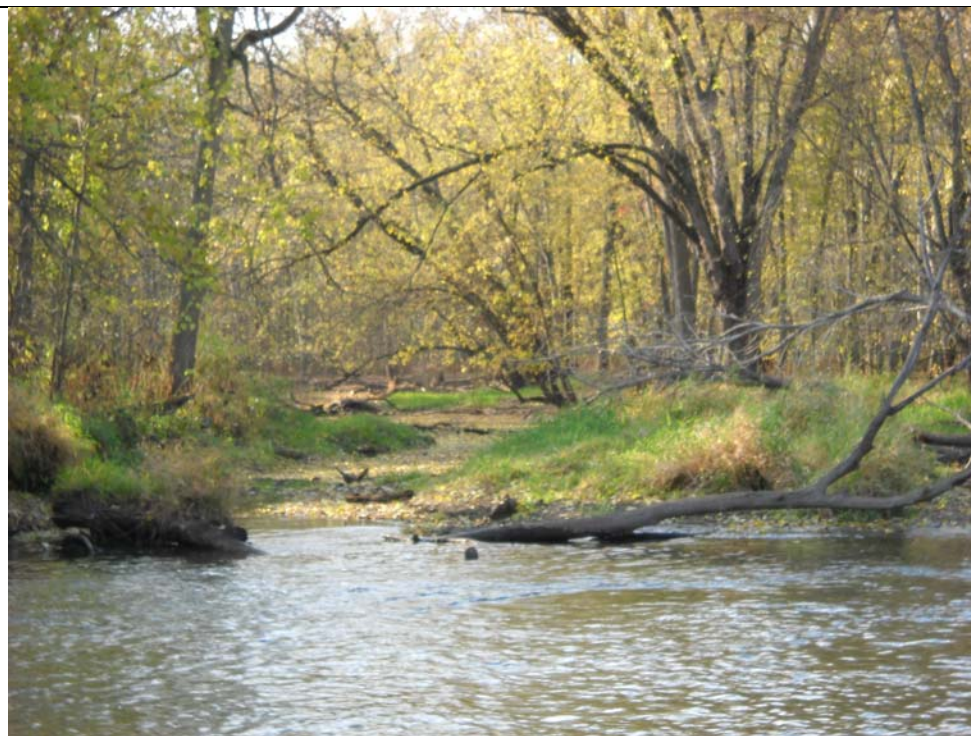
Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
28.25

Date:
10/24/10

Description:
Post recovery – recovery
activities complete

View Direction:
N/A



**Enbridge Line 6B MP 608 Pipeline Release
Marshall, Michigan**

**Permanent Recovery of Submerged Oil and Oil-Contaminated
Sediments at Priority Locations**

**Submerged Oil Recovery Summary Report
Kalamazoo River MP 33.0 A and B Backwater Channels**

Enbridge Energy

EXECUTIVE SUMMARY

A Submerged Oil Task Force (SOTF) was created on Tuesday, August 24, 2010, to perform field assessment, characterization, and mapping of submerged oil impacts in surface water and sediments of Talmadge Creek, Kalamazoo River and Morrow Lake (Talmadge Creek to Kalamazoo River to River Mile Post [RMP] 40). The SOTF is comprised of representatives from the United States Environmental Protection Agency (USEPA), the Michigan Department of Natural Resources and the Environment (MDNRE), Stakeholders, Enbridge and their contractors.

As a result of the initial field assessments, 34 sites in the Kalamazoo River had been identified as potentially containing accumulations of significant amounts of submerged oil in river sediments. These areas were further investigated, and 18 were identified as high priority areas and were recommended for submerged oil recovery by the SOTF. These 18 priority areas were also subjected to an ecological habitat assessment intended to classify their ecological use and value to help guide cleanup operations. The SOTF discussed the assessment in conjunction with possible cleanup approaches, and in a September 21, 2010 memorandum the Task Force Leaders provided recommendations for oil removal for these 18 priority areas.

Initial Assessment

The Qualitative Assessment was a reconnaissance effort to identify areas with the presence of submerged oil, identify depositional areas, prioritize sites based on a relative comparison of impacted sites, and obtain information on the depositional and erosional characteristics of geomorphic settings in which the impacted sites were identified. This was accomplished by in-channel sediment poling, which consisted of inserting a graduated metal pole equipped with a foot disk, into the sediment and recording visual evidence of oil, sheen (light, moderate, or heavy), droplets, globules, and/or tar balls after the sediment was agitated. Each poling location was located by GPS, with the elevation of the water surface, depth of water, top of sediment, and depth of soft sediment recorded. The primary criterion for prioritizing sites for quantitative sampling was the visual presence of oil in the qualitative phase. These areas were identified by the Tetra Tech field scientists. Depositional areas of the river were mapped and targeted for sampling during the quantitative sampling program.

RMP 33.0 - (A & B – Backwater Channels)

MP 33 A and B are two small backwater areas on left and right sides of the river approximately 600 feet apart. Both MP 33 A and B are approximately 0.33 acres each. These backwater areas are stagnant open water channels with dead branches in the water. The water depth is less than 1 foot, with 0.5 to 1.5 feet of soft sediment over sand.

Actions

MP 33 A and B were divided into 7 cells for MP 33 A, and 8 cells for MP 33 B, for oil recovery purposes (please refer to the sign-off sheets in the enclosed attachments for sketches of the cell layouts). Oil recovery activities ran through September 23, 2010. The cells were aerated with a combination of pond aerators and manual raking. In area MP 33 A the pond aerator was partially used in all 7 cells. However, only one cell had three passes with the pond aerator. The remaining cells were manually raked. In area MP 33 B all 8 cells received two passes with the pond aerator. In addition, the 8 cells were manually raked concentrating in the shallow sections of each cell. Oil was collected using absorbent boom and pads as the light sheen appeared. On

September 23, 2010, priority site(s) MP 33 A and B were recommended for final sign-off.

Outcome

The site was visited by USEPA and Enbridge representatives on September 29, 2010. The USEPA and Enbridge representatives entered the site via airboat and disturbed sediment throughout the cells. In area MP 33 A some flakes were observed in cell 3, but no discernable oil was noted in sediment before and after agitation. In area MP 33 B, no discernable oil was noted in sediment before and after agitation. Sites MP 33 A and B were cleared and received final sign-off.

Attachment Descriptions

The ensuing information listed below directly follows in this Submerged Oil Recovery Summary Report:

- USEPA and Enbridge signed Submerged Oil Remediation Status Tracking Form.
 - Contains signatory approvals.
- Site Summary
 - Provides information used by the field teams to better understand site specific characteristics of the priority locations and determined the most appropriate recovery technology. Information included site layout, areal extent, depth to water, sediment thickness, sediment bed type, data collected, habitat description and habitat quality, containment measures, access, and recommendations.
- Pre- and Post- Submerged Oil Recovery Figures
 - Presents qualitative pre- and post- poling data in a graphical format.
- Photographs
 - Provides visual documentation of pre- and post- submerge oil recovery activities.

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 9-23-2010

EPA(REP): John Day

ENBRIDGE(REP): Robert Suehs

LOCATION
(Division/Sect/MP)

MP 33A

CLEANUP METHODS USED

Method:	<u>Aeration</u>	Notes:	<u>Aeration in one complete cell, 3 passes; remaining 6 cells partially aerated</u>
Method:	<u>Raking</u>	Notes:	<u>All partially aerated cells were raked.</u>
Method:		Notes:	

OIL COLLECTION METHODS USED

Method: Sorbent pads---collected light sheen as it appeared

Method: .

DISCERNABLE OIL
OBSERVED (end of day) NO

Sheen(heavy, medium, light) no Globules no

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): YES

Team Lead: Robert Suehs

Remediation Complete

SITE APPROVAL

EPA:

Enbridge:

Name

Signature

Date

Carl Pellegrino

Karl Beaster

[Signature]

Karl Beaster

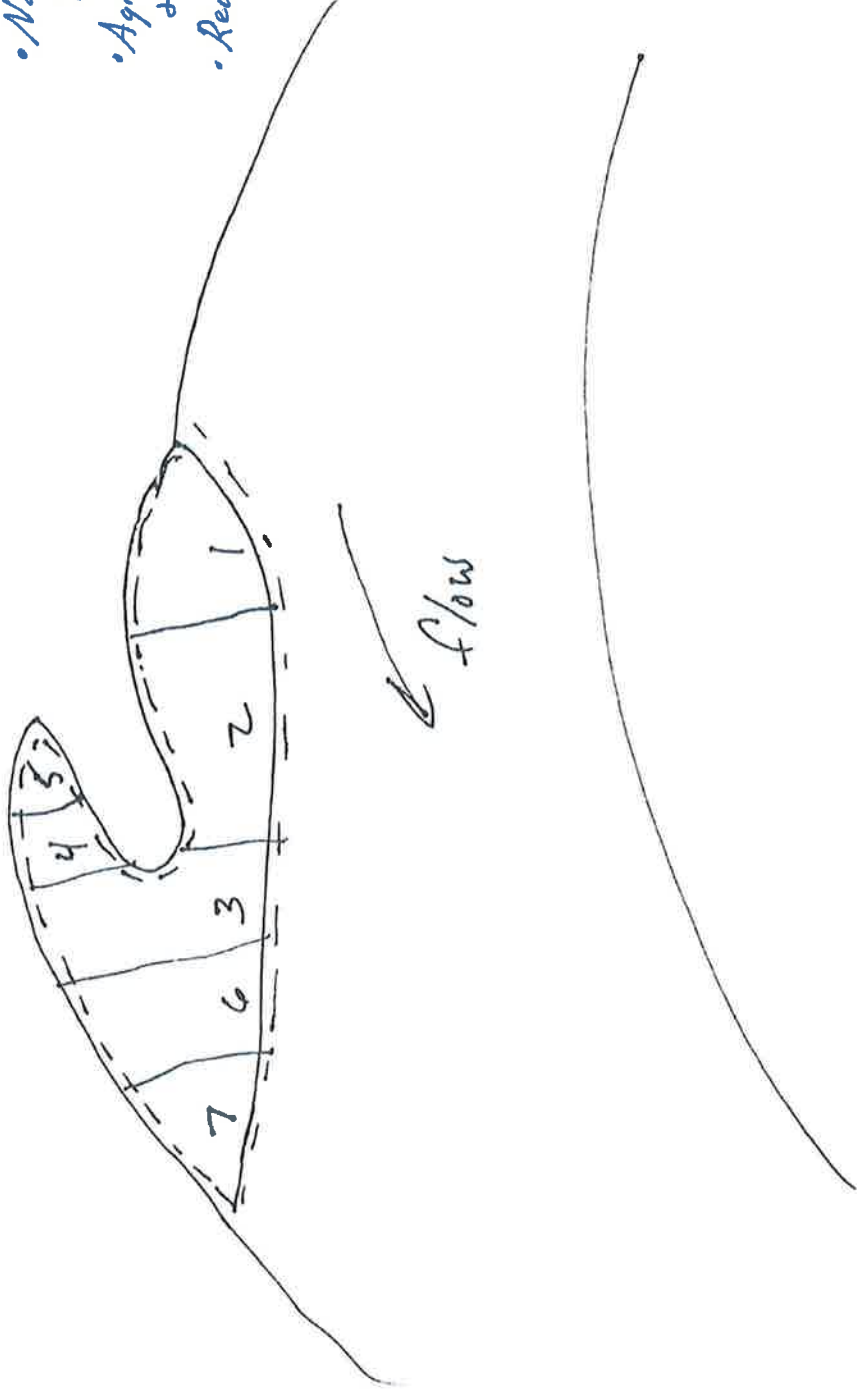
09/29/10

09/29/10

MP 33A

HFB Notes

- Photos taken
- Slight sheen noted in all cells but likely a result of boat dragging over absorbent boom.
- Some flecks noted in cell #3
- No discernable oil in sediment before & after agitation
- Agitation performed by air-boat & paddle
- Recommend site completion & boom removal



SITE SUMMARY – MP 33.00 A (NORTH) AND MP 33.00 B (SOUTH)*

*Designation A and B used by Field Teams. Not indicated on Priority List.

The information provided below shall be used by the field teams to better understand site specific characteristics of the priority locations and determine the most appropriate recovery technology.

Site Location:	MP 33.00 A (NORTH)
Site Layout:	See Figure Attached
Description and Geomorphic Setting:	Backwater area on right side looking downstream; two depositional coves 42.29678, 85.3868
Approximate Areal Extent:	0.25 to 0.50 acres
Approximate Depth of Water:	< 1 foot
Sediment thickness:	0.5 to 1.0 foot
Bed type:	Soft sediment over sand
Data Collected:	
Poling (Y/N)	Y
Cores (Y/N)	Y
Lab analysis (Y/N)	Y
Community Description and Habitat Quality:	Cove with stagnant open water 6-12 inches deep. Some dead branches in the water. Area is surrounded by palustrine forest. Juvenile fish nursery habitat and refuge habitat, although none seen here. Amphibian habitat along the edge. A significant 20-acre cattail marsh extends to the east.
Containment:	500' hard boom, 500' X-TEX
Access Issues:	Easy
Miscellaneous:	N/A
Recommendations:	ECO: No major environmental concerns. Aeration or some sediment removal would be acceptable, but the shallow depth should be maintained. SOTF: Recommend that reasonably aggressive steps be taken to remove the oil. The technique employed would rely primarily on aeration, but may also include sediment skimming, flushing, raking or a combination of these.

**Talmadge Creek/Kalamazoo River
Submerged Oil Remediation
STATUS TRACKING FORM**

DATE: 9-23-2010

EPA(REP): John Day

ENBRIDGE(REP): Robert Suehs

LOCATION
(Division/Sect/MP)

MP 33B

CLEANUP METHODS USED

Method: Aeration Notes: All cells (8) aerated 2 passes each

Method: Raking Notes: All cells were raked—concentrating on the shallow sections.

Method: _____ Notes: _____

OIL COLLECTION METHODS USED

Method: Sorbent pads—collected light sheen as it appeared

Method: _____

**DISCERNABLE OIL
OBSERVED (end of day)** NO

Sheen(heavy, medium, light) no Globules no

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): YES

Team Lead: Robert Suehs

Remediation Complete

SITE APPROVAL

Name

Signature

Date

EPA:

Enbridge:

Carl Pellegrino

Karl Beaster

[Signature]

[Signature]

9-29-10

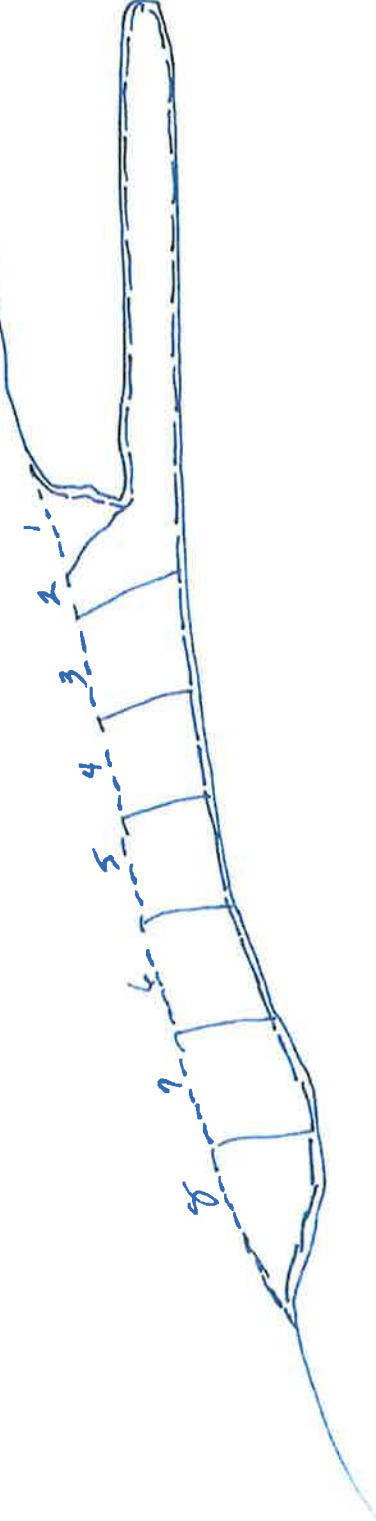
09-29-10

33B

KFB Notes

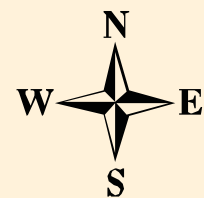
- Photos taken
- Cells were subdivided in the middle of each
- Very slight sheen noted in most cells - likely result of boat drag over absorbent boom
- N. discernable oil in sediment before & after agitation
- Agitation performed by air-boat & paddle
- Recommend site completion & boom removal

Flow



Site SUMMARY – MP 33.00 A (North) and MP 33.00 B (SOUTH)* (Continued)

Site Location:	MP 33.00 B (SOUTH)
Site Layout:	See Figure Attached
Description and Geomorphic Setting:	Backwater channel
Approximate Areal Extent:	0.33 acres
Approximate Depth of Water:	1 foot
Sediment thickness:	0.5 to 1.5 feet
Bed type:	Soft sediment over sand
Data Collected:	
Poling (Y/N)	Y
Cores (Y/N)	Y
Lab analysis (Y/N)	Y
Community Description and Habitat Quality:	Cove with stagnant open water 6-12 inches deep. Some dead branches in the water. Area is surrounded by palustrine forest. Juvenile fish nursery habitat and refuge habitat, although none seen here. Amphibian habitat along the edge. A significant 20-acre cattail marsh extends to the east.
Containment:	400' hard boom, 400' X-Tex
Access Issues:	Moderate
Miscellaneous:	N/A
Recommendations:	ECO: No major environmental concerns. Aeration or some sediment removal would be acceptable, but the shallow depth should be maintained. SOTF: Recommend that reasonably aggressive steps be taken to remove the oil. The technique employed would rely primarily on aeration, but may also include sediment skimming, flushing, raking or a combination of these.



0 150 300
1 inch = 150 feet

Legend

Pre Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy
- Observed But Quantity Not Noted

Priority Areas

Submerged Oil Delineation Area

Priority Area Approximate Containment (if known)

Division Quarter Mile Grid

**Poling Data Collected Through:
September 12, 2010**

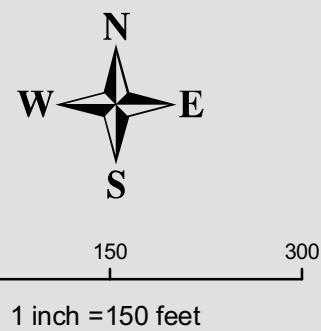
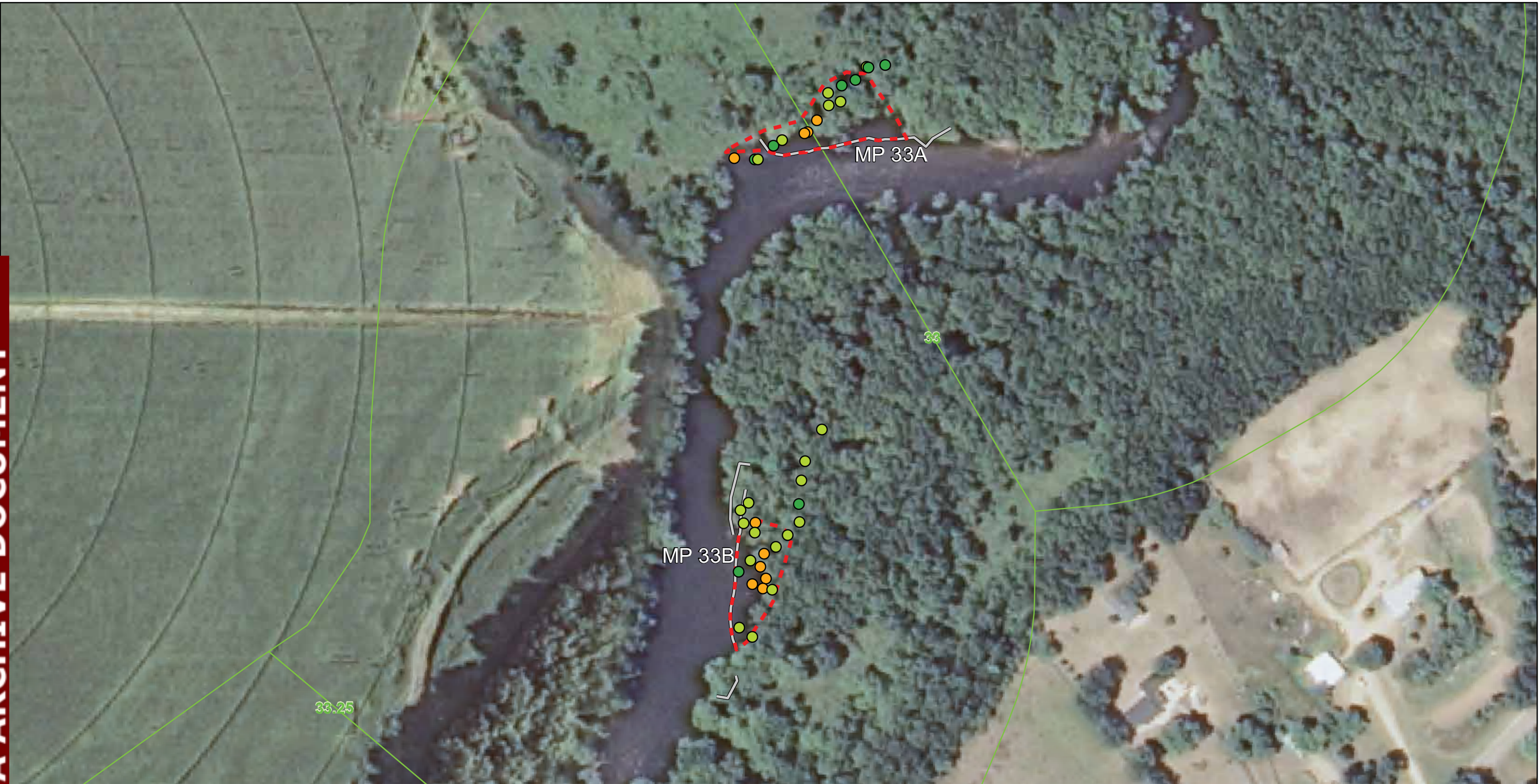
Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA PRE RECOVERY
QUALITATIVE RESULTS
MP 33.0**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 25, 2010





Legend

Post Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

Poling Data Collected Through:
October 14, 2010

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

PRIORITY AREA POST RECOVERY QUALITATIVE RESULTS MP 33.0

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 26, 2010



TETRA TECH EC, INC.

PHOTOGRAPH LOG

Photograph 1

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
33

Date:
9/23/10

Description:
Recovery activities in
progress – aeration

View Direction:
Facing north



PHOTOGRAPH LOG

Photograph 2

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
33

Date:
9/23/10

Description:
Recovery activities in
progress – aeration

View Direction:
Facing north



PHOTOGRAPH LOG
Photograph 3

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
33

Date:
9/23/10

Description:
Recovery activities in
progress – aeration

View Direction:
Facing northwest

**PHOTOGRAPH LOG**
Photograph 4

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
33

Date:
9/23/10

Description:
Recovery activities in
progress – aeration

View Direction:
Facing north



PHOTOGRAPH LOG

Photograph 5

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
33

Date:
10/24/10

Description:
Post recovery – recovery
activities complete and
containment removed

View Direction:
Facing south



PHOTOGRAPH LOG

Photograph 6

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
33

Date:
10/24/10

Description:
Post recovery – recovery
activities complete and
containment removed

View Direction:
Facing north



**Enbridge Line 6B MP 608 Pipeline Release
Marshall, Michigan**

**Permanent Recovery of Submerged Oil and Oil-Contaminated
Sediments at Priority Locations**

**Submerged Oil Recovery Summary Report
Kalamazoo River MP 33.25 Backwater Channel**

Enbridge Energy

EXECUTIVE SUMMARY

A Submerged Oil Task Force (SOTF) was created on Tuesday, August 24, 2010, to perform field assessment, characterization, and mapping of submerged oil impacts in surface water and sediments of Talmadge Creek, Kalamazoo River and Morrow Lake (Talmadge Creek to Kalamazoo River to River Mile Post [RMP] 40). The SOTF is comprised of representatives from the United States Environmental Protection Agency (USEPA), the Michigan Department of Natural Resources and the Environment (MDNRE), Stakeholders, Enbridge and their contractors.

As a result of the initial field assessments, 34 sites in the Kalamazoo River had been identified as potentially containing accumulations of significant amounts of submerged oil in river sediments. These areas were further investigated, and 18 were identified as high priority areas and were recommended for submerged oil recovery by the SOTF. These 18 priority areas were also subjected to an ecological habitat assessment intended to classify their ecological use and value to help guide cleanup operations. The SOTF discussed the assessment in conjunction with possible cleanup approaches, and in a September 21, 2010 memorandum the Task Force Leaders provided recommendations for oil removal for these 18 priority areas.

Initial Assessment

The Qualitative Assessment was a reconnaissance effort to quickly identify areas with the presence of submerged oil, identify depositional areas, prioritize sites based on a relative comparison of impacted sites, and obtain information on the depositional / erosional characteristics of geomorphic settings in which the impacted sites were identified. This was accomplished by an initial visual assessment followed by in-channel sediment poling, which consisted of inserting a graduated metal pole equipped with a foot disk, into the sediment and recording visual evidence of oil, sheen (light, moderate, or heavy), droplets, globules, and/or tar balls after the sediment was agitated. Each poling location was located by GPS, with the elevation of the water surface, depth of water, top of sediment, and depth of soft sediment recorded. Both the visual assessment and the poling results were documented in field logs. The qualitative poling results of RMP 33.25 was not indicative of the visual field observations made that warranted this site to be designated as a priority site. The primary criterion for prioritizing sites for quantitative sampling was the visual presence of oil in the qualitative phase. These areas were identified by the Tetra Tech field scientists. Depositional areas of the river were mapped and targeted for sampling during the quantitative sampling program.

RMP 33.25 - (Backwater Channel)

MP 33.25 is a backwater channel on the right side looking downstream, with a small island in the center of the 0.75 acre area. This backwater channel is open water and shallow, overlying a silty bottom with 0.5 to 1.5 feet of soft sediment over sand.

Actions

MP 33.25 was divided into 14 cells for oil recovery purposes (please refer to the sign-off sheet in the attachments for a sketch of the cell layout). Oil recovery activities ran through September 24, 2010. The cells were aerated with a combination of pond aerators and manual raking. In MP 33.25 twelve cells received two to three passes with the pond aerator. The two remaining cells were raked. In addition, all 14 cells were manually spot raked. Oil was collected using absorbent boom and pads as the light sheen appeared. On September 24, 2010, priority site MP 33.25

was recommended for final sign-off.

Outcome

The site was visited by USEPA and Enbridge representatives on September 29, 2010. The USEPA and Enbridge representatives entered the site via airboat and disturbed sediment throughout the cells. In area MP 33.25 no discernable oil was noted in sediment before and after agitation. Site MP 33.25 was cleared and received final sign-off.

Attachment Descriptions

The ensuing information listed below directly follows in this Submerged Oil Recovery Summary Report:

- USEPA and Enbridge signed Submerged Oil Remediation Status Tracking Form.
 - Contains signatory approvals.
- Site Summary
 - Provides information used by the field teams to better understand site specific characteristics of the priority locations and determined the most appropriate recovery technology. Information included site layout, areal extent, depth to water, sediment thickness, sediment bed type, data collected, habitat description and habitat quality, containment measures, access, and recommendations.
- Pre- and Post- Submerged Oil Recovery Figures
 - Presents qualitative pre- and post- poling data in a graphical format.
- Photographs
 - Provides visual documentation of pre- and post- submerge oil recovery activities.

**Talmadge Creek/Kalamazoo River
Submerged Oil Remediation
STATUS TRACKING FORM**

DATE: 9-24-2010

EPA(REP): John Day

ENBRIDGE(REP): Robert Suehs

LOCATION
(Division/Sect/MP)

MP 33.25

CLEANUP METHODS USED

Method: Aeration Notes: 12 cells aerated 2-3 passes/cell

Method: Raking Notes: Remaining cells (2) were raked. Spot raking all cells

Method: _____ Notes: _____

OIL COLLECTION METHODS USED

Method: Sorbent pads---collected light sheen as it appeared

Method: _____

DISCERNABLE OIL
OBSERVED (end of day) NO

Sheen(heavy, medium, light) _____ no _____ Globules _____ no

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): YES

Team Lead: Robert Suehs

Remediation Complete
SITE APPROVAL

EPA:

Enbridge:

Name

Signature

Date

CARL PUGGINO

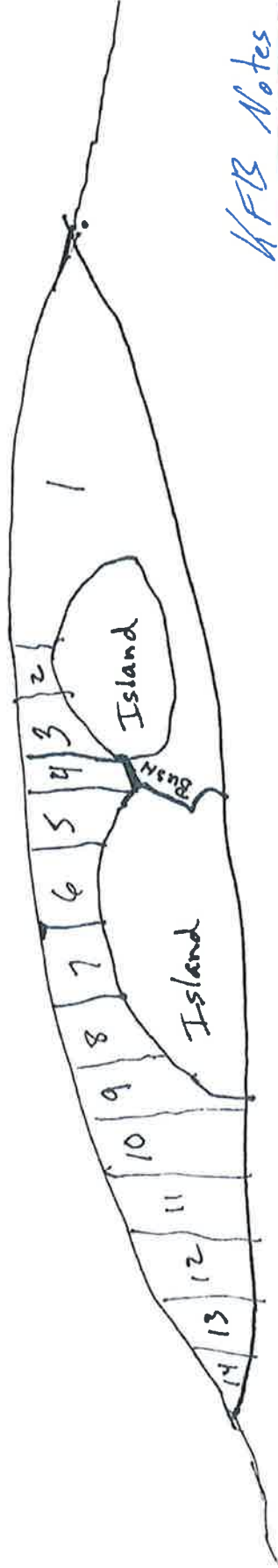
Karl Beaster




9-29-10

09-29-10

MP 33.25



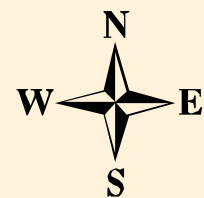
WFB Notes

- Photos taken
- No sheen/oil in cell #1
- Slight sheen in cells #2-14 likely result of boat drag over boom
- No discernable oil is sediment before + after agitation
- Agitation performed by air-bort + paddle
- Recommend site completion + boom removal

SITE SUMMARY – MP 33.25

The information provided below shall be used by the field teams to better understand site specific characteristics of the priority locations and determine the most appropriate recovery technology.

Site Location:	MP 33.25
Site Layout:	See Figure Attached
Description and Geomorphic Setting:	Backwater channel on the right side looking downstream, with island.
Approximate Areal Extent:	0.75 acres
Approximate Depth of Water:	Unknown
Sediment thickness:	0.5 to 1.5 feet
Bed type:	Soft Sediment over sand
Data Collected:	
Poling (Y/N)	Y
Cores (Y/N)	Y
Lab analysis (Y/N)	Y
Community Description and Habitat Quality:	Backwater channel is open water and shallow, with no vegetation, overlying silty bottom. Tiny juvenile fish observed. Surrounded by palustrine forest dominated by silver maple.
Containment:	500' total hard boom, 500' total X-Tex
Access Issues:	Easy to moderate
Miscellaneous:	N/A
Recommendations:	ECO: No major environmental concerns. Could stand disturbance to the channel itself, similar to other shallow coves on the river. SOTF: Recommend that reasonably aggressive steps be taken to remove the oil. The technique employed would rely primarily on aeration, but may also include sediment skimming, flushing, raking or a combination of these.



0 100 200
1 inch = 100 feet

Legend

Pre Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy
- Observed But Quantity Not Noted

Priority Areas

Submerged Oil Delineation Area

Priority Area Approximate Containment (if known)

Division Quarter Mile Grid

**Poling Data Collected Through:
September 30, 2010**

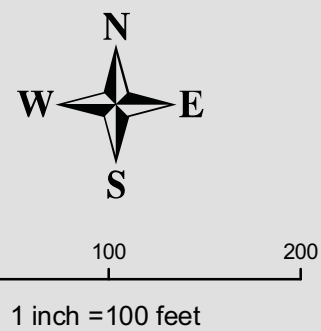
Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA PRE RECOVERY
QUALITATIVE RESULTS
MP 33.25**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 25, 2010





Legend

Post Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

**Poling Data Collected Through:
October 15, 2010**

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA POST RECOVERY
QUALITATIVE RESULTS
MP 33.25**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 26, 2010



TETRA TECH EC, INC.

PHOTOGRAPH LOG
Photograph 1

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
33.25

Date:
9/23/10

Description:
Recovery activities in
progress - aeration

View Direction:
Facing northwest

**PHOTOGRAPH LOG**
Photograph 2

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
33.25

Date:
9/23/10

Description:
Recovery activities in
progress - aeration

View Direction:
Facing northwest



PHOTOGRAPH LOG
Photograph 3

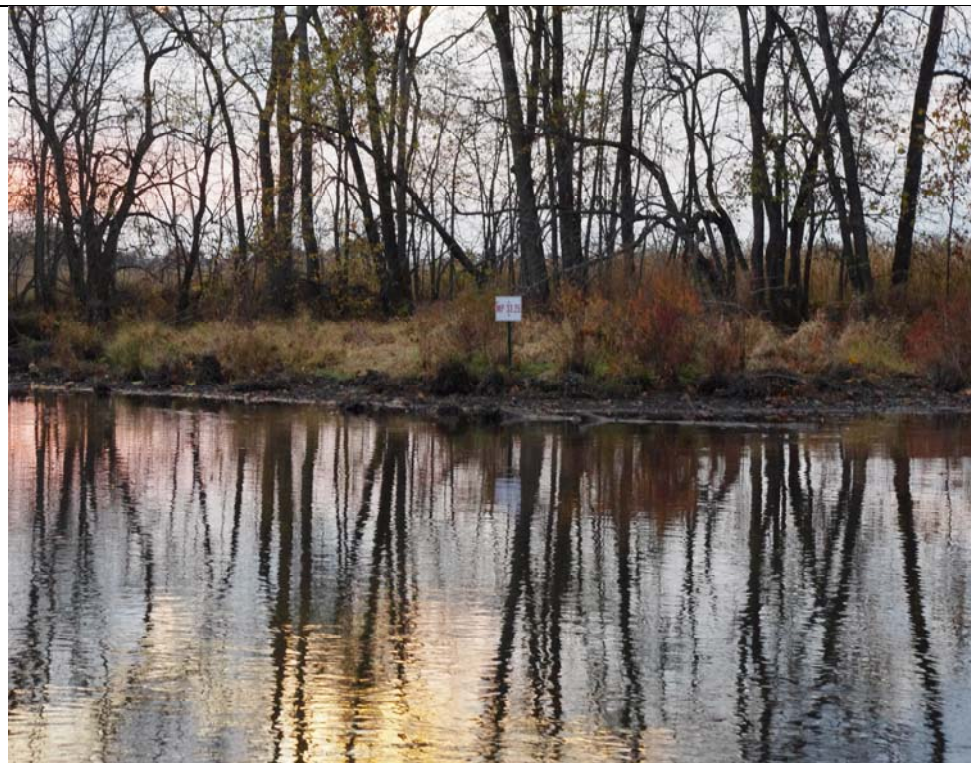
Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
33.25

Date:
10/24/10

Description:
Post recovery - recovery
activities complete and
containment removed

View Direction:
Facing northwest

**PHOTOGRAPH LOG**
Photograph 4

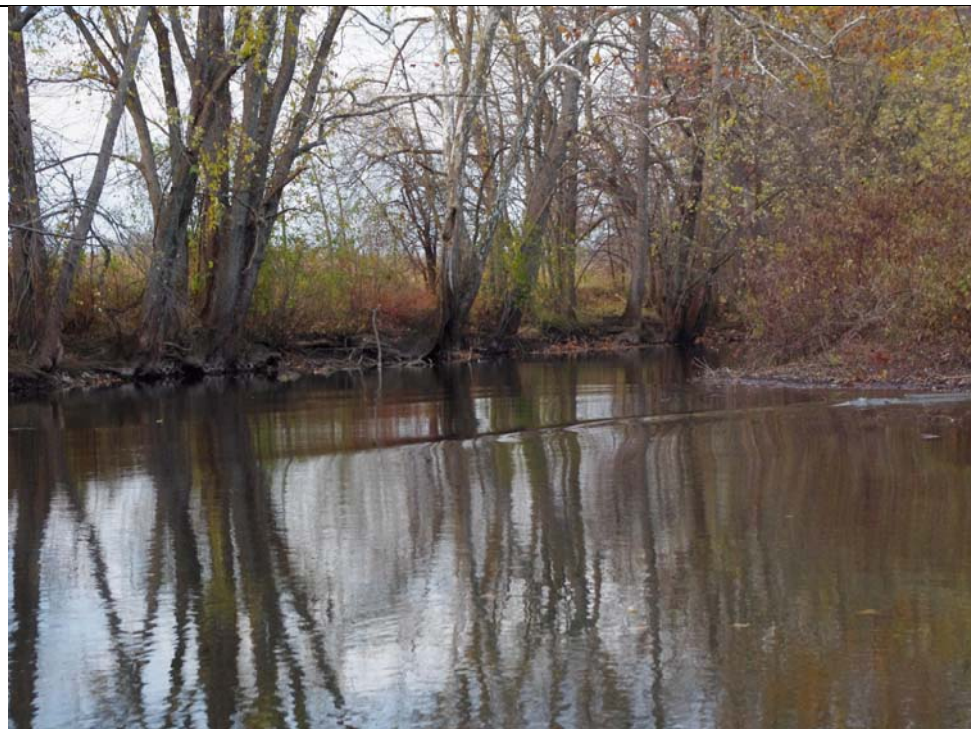
Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
33.25

Date:
10/24/10

Description:
Post recovery - recovery
activities complete and
containment removed

View Direction:
Facing northeast



**Enbridge Line 6B MP 608 Pipeline Release
Marshall, Michigan**

**Permanent Recovery of Submerged Oil and Oil-Contaminated
Sediments at Priority Locations**

**Submerged Oil Recovery Summary Report
Kalamazoo River MP 36.25 Cutoff Meander**

Enbridge Energy

EXECUTIVE SUMMARY

A Submerged Oil Task Force (SOTF) was created on Tuesday, August 24, 2010, to perform field assessment, characterization, and mapping of submerged oil impacts in surface water and sediments of Talmadge Creek, Kalamazoo River and Morrow Lake (Talmadge Creek to Kalamazoo River to River Mile Post [RMP] 40). The SOTF is comprised of representatives from the United States Environmental Protection Agency (USEPA), the Michigan Department of Natural Resources and the Environment (MDNRE), Stakeholders, Enbridge and their contractors.

As a result of the initial field assessments, 34 sites in the Kalamazoo River had been identified as potentially containing accumulations of significant amounts of submerged oil in river sediments. These areas were further investigated, and 18 were identified as high priority areas and were recommended for submerged oil recovery by the SOTF. These 18 priority areas were also subjected to an ecological habitat assessment intended to classify their ecological use and value to help guide cleanup operations. The SOTF discussed the assessment in conjunction with possible cleanup approaches, and in a September 21, 2010 memorandum the Task Force Leaders provided recommendations for oil removal for these 18 priority areas.

Initial Assessment

The Qualitative Assessment was a reconnaissance effort to identify areas with the presence of submerged oil, identify depositional areas, prioritize sites based on a relative comparison of impacted sites, and obtain information on the depositional and erosional characteristics of geomorphic settings in which the impacted sites were identified. This was accomplished by in-channel sediment poling, which consisted of inserting a graduated metal pole equipped with a foot disk, into the sediment and recording visual evidence of oil, sheen (light, moderate, or heavy), droplets, globules, and/or tar balls after the sediment was agitated. Each poling location was located by GPS, with the elevation of the water surface, depth of water, top of sediment, and depth of soft sediment recorded. The primary criterion for prioritizing sites for quantitative sampling was the visual presence of oil in the qualitative phase. These areas were identified by the Tetra Tech field scientists. Depositional areas of the river were mapped and targeted for sampling during the quantitative sampling program.

RMP 36.25 - (Cutoff Meander)

MP 36.25 is a cutoff meander on the left side looking downstream approximately 1.33 acres in extent. This cutoff meander has trees blocking the meander where it narrows. The water depth is 1 to 3 feet with 0.5 to 1.5 feet of soft sediment overlying sand.

Actions

None.

Outcome

The site was visited by USEPA and Enbridge representatives on October 8, 2010. The USEPA and Enbridge representatives entered the site via airboat. According to the USEPA representative "...Site 36.25 had small areas of light sheen or trace sheen rise after passing over and spinning the airboat. However, no tar balls or globules were noted. The site does not warrant being added as a priority area..." Site MP 36.25 was cleared and received final sign-off.

Attachment Descriptions

The ensuing information listed below directly follows in this Submerged Oil Recovery Summary Report:

- USEPA and Enbridge signed Submerged Oil Remediation Status Tracking Form.
 - Contains signatory approvals.
- Site Summary
 - Provides information used by the field teams to better understand site specific characteristics of the priority locations and determined the most appropriate recovery technology. Information included site layout, areal extent, depth to water, sediment thickness, sediment bed type, data collected, habitat description and habitat quality, containment measures, access, and recommendations.
- Pre- and Post- Submerged Oil Recovery Figures
 - Presents qualitative pre- and post- poling data in a graphical format.
- Photographs
 - Provides visual documentation of pre- and post- submerge oil recovery activities.

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 10/23/10

EPA(REP): Paul Peronard #

ENBRIDGE(REP): Scott Swiech/Bryan Sederberg

LOCATION

(Division/Sect/MP)

MP 36.25

Site was inspected on 10/23 by Peronard, Scott Swiech and Bryan Sederberg. Based on their observations and the poling data provided by Tetratex, they determined that at this time, no further recovery operations are required.

CLEANUP METHODS USED

Method: Notes:

Method: Notes:

Method: Notes:

OIL COLLECTION METHODS USED

Method:

Method:

DISCERNABLE OIL

OBSERVED (end of day) no

Sheen(heavy, medium, light) no Globules no

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): YES

Team Lead:

Site MP 36.25 was not identified as a Priority Site

Remediation Complete

SITE APPROVAL

Name

Signature

Date

EPA:

PAUL PERONARD

Enbridge:

Scott Swiech

Signature
Scott Swiech

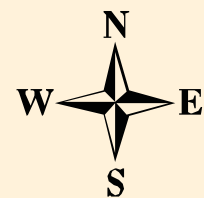
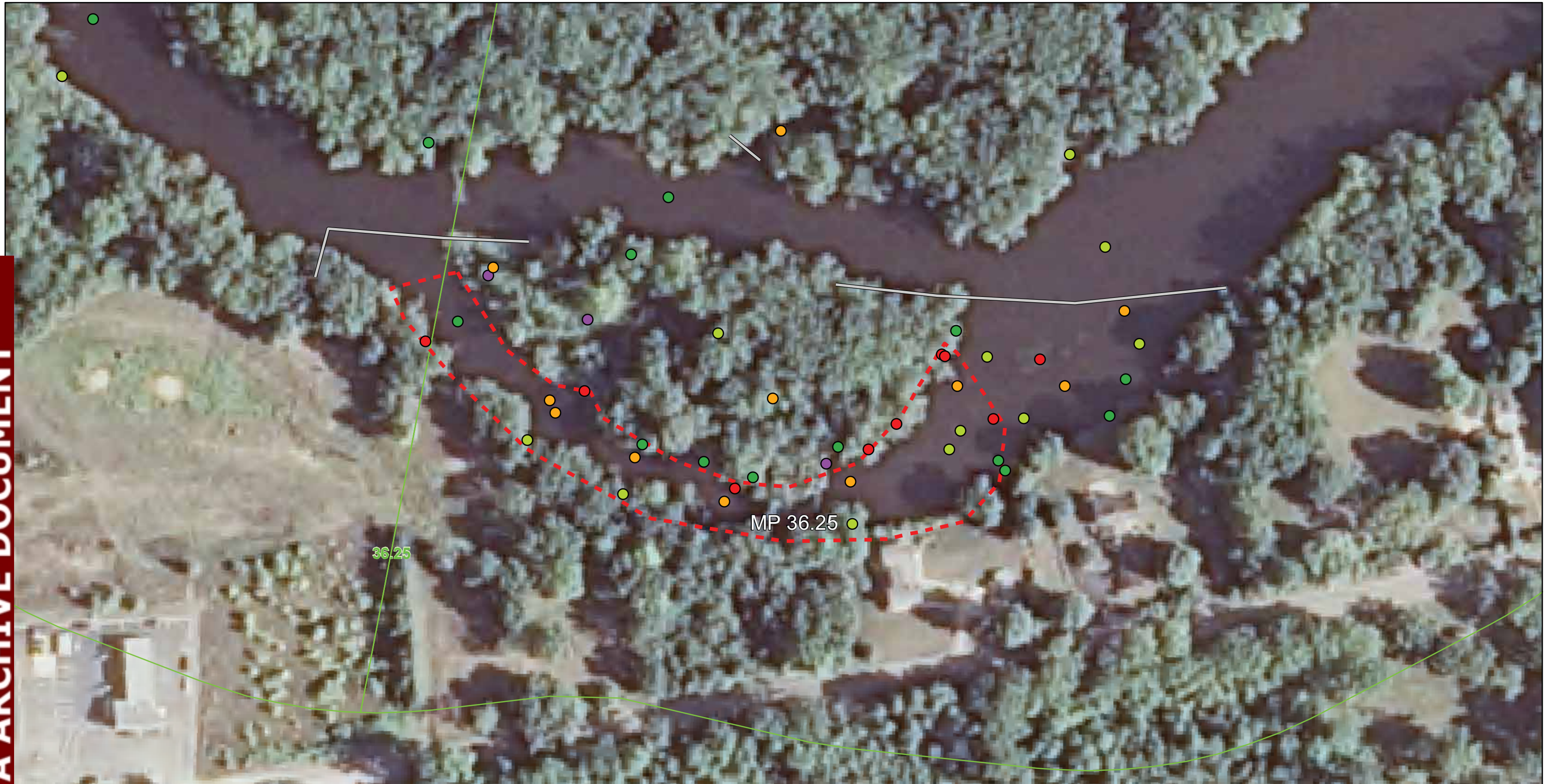
10/23/2010

10/23/2010

SITE SUMMARY – MP 36.25

The information provided below shall be used by the field teams to better understand site specific characteristics of the priority locations and determine the most appropriate recovery technology.

Site Location:	MP 36.25
Site Layout:	See Figure Attached
Description and Geomorphic Setting:	Cut-off meander
Approximate Areal Extent:	~ 1.33 acres
Approximate Depth of Water:	1 – 3 feet
Sediment thickness:	0.5 – 1.5 feet
Bed type:	Soft sediment over sand
Data Collected:	
Poling (Y/N)	Y
Cores (Y/N)	Y
Lab analysis (Y/N)	Y
Community Description and Habitat Quality:	
Containment:	
Access Issues:	Trees block channel where it narrows
Miscellaneous:	Wetlands on island have submerged oil but are no longer connected to river.
Recommendations:	<p>ECO: This channel will have to be dealt with carefully to avoid impacts to aquatic plants and animals. Dredging should be avoided and any re-suspension activities should avoid impacting the submerged aquatic vegetation beds and be cordoned off with a silt curtain that will minimize impacts to fish.</p> <p>SOTF: Less aggressive invasive action at this time. Cautious raking and/or flushing, taking care to avoid damage to existing vegetation. Recommend that oil containment boom around these areas be reconfigured to allow maximum water flow into and out of these areas and that downstream collection be adequately maintained to capture potential releases.</p>



0 100 200
1 inch = 100 feet

Legend

Pre Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy
- Observed But Quantity Not Noted

Priority Areas

Submerged Oil Delineation Area

Priority Area Approximate Containment (if known)

Division Quarter Mile Grid

Poling Data Collected Through:
October 4, 2010

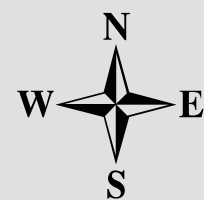
Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

PRIORITY AREA PRE RECOVERY QUALITATIVE RESULTS MP 36.25

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 25, 2010





0 100 200

1 inch = 100 feet

Legend

Post Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

**Poling Data Collected Through:
October 24, 2010**

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA POST RECOVERY
QUALITATIVE RESULTS
MP 36.25**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 26, 2010



TETRA TECH EC, INC.

PHOTOGRAPH LOG

Photograph 1

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
36.25

Date:
10/23/10

Description:
Site conditions at
determination of no action
needed and sign-off

View Direction:
Facing south



PHOTOGRAPH LOG

Photograph 2

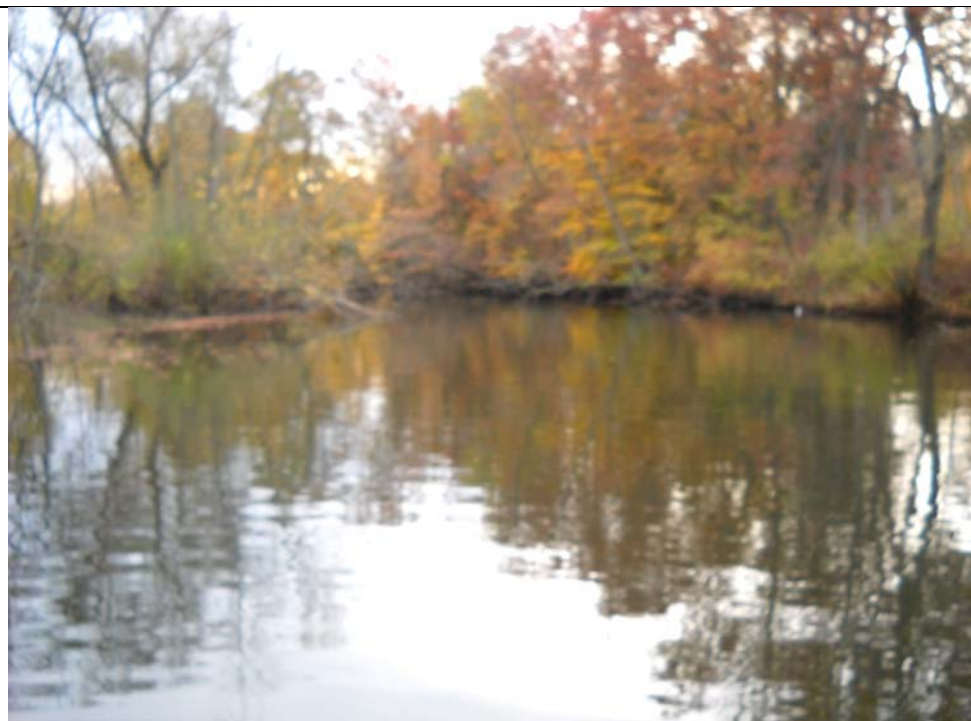
Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
36.25

Date:
10/24/10

Description:
Site conditions day after
determination of no action
needed and sign-off

View Direction:
Facing south



**Enbridge Line 6B MP 608 Pipeline Release
Marshall, Michigan**

**Permanent Recovery of Submerged Oil and Oil-Contaminated
Sediments at Priority Locations**

**Submerged Oil Recovery Summary Report
Kalamazoo River MP 36.5 to 37.5 (Morrow Lake Delta)**

Enbridge Energy

EXECUTIVE SUMMARY

A Submerged Oil Task Force (SOTF) was created on Tuesday, August 24, 2010, to perform field assessment, characterization, and mapping of submerged oil impacts in surface water and sediments of Talmadge Creek, Kalamazoo River and Morrow Lake (Talmadge Creek to Kalamazoo River to River Mile Post [RMP] 40). The SOTF is comprised of representatives from the United States Environmental Protection Agency (USEPA), the Michigan Department of Natural Resources and the Environment (MDNRE), Stakeholders, Enbridge and their contractors.

As a result of the initial field assessments, 34 sites in the Kalamazoo River had been identified as potentially containing accumulations of significant amounts of submerged oil in river sediments. These areas were further investigated, and 18 were identified as high priority areas and were recommended for submerged oil recovery by the SOTF. These 18 priority areas were also subjected to an ecological habitat assessment intended to classify their ecological use and value to help guide cleanup operations. The SOTF discussed the assessment in conjunction with possible cleanup approaches, and in a September 21, 2010 memorandum the Task Force Leaders provided recommendations for oil removal for these 18 priority areas.

Initial Assessment

The Qualitative Assessment was a reconnaissance effort to identify areas with the presence of submerged oil, identify depositional areas, prioritize sites based on a relative comparison of impacted sites, and obtain information on the depositional and erosional characteristics of geomorphic settings in which the impacted sites were identified. This was accomplished by in-channel sediment poling, which consisted of inserting a graduated metal pole equipped with a foot disk, into the sediment and recording visual evidence of oil, sheen (light, moderate, or heavy), droplets, globules, and/or tar balls after the sediment was agitated. Each poling location was located by GPS, with the elevation of the water surface, depth of water, top of sediment, and depth of soft sediment recorded. The primary criterion for prioritizing sites for quantitative sampling was the visual presence of oil in the qualitative phase. These areas were identified by the Tetra Tech field scientists. Depositional areas of the river were mapped and targeted for sampling during the quantitative sampling program.

RMP 36.5 to 37.5 - (Morrow Lake Delta)

MP 36.5 to 37.5 is a 40-acre delta area on the eastern, or upstream, end of Morrow Lake. The delta consists of interconnected braided channels and islands. Overall the delta is considered high quality habitat. However, the islands themselves are dominated by purple loosestrife so they have limited wildlife habitat value. Nonetheless, the islands do provide cover for fish that hang along their edges. The deeper water (2 to 3 feet deep) provides excellent habitat for adult fish. The water depth in the delta is usually 0 to 1 feet with deeper depths in the channels between the vegetated islands. The sediment thickness varies, but generally it was reported to be 0 to 1 feet of soft sediment over sand.

Actions

MP 36.5 to 37.5 was divided into 7 main work areas with Area 7 further subdivided in 6 subsets (7A through 7E). Cells for oil recovery purposes (please refer to the sign-off sheet in the attachments for a sketch of the cell layout). Oil recovery activities ran from October 15, 2010, through October 24, 2010. The cells were aerated with a combination of water wand flushing

(from both boats and in water walking in line in waders), pond aerators, and manual raking. Oil was collected using absorbent boom and pads, and skimmers. On October 24, 2010, priority site MP 33.25 was recommended for final sign-off.

Outcome

Morrow Lake Delta was visited by USEPA and Enbridge representatives on October 23, 2010. The USEPA and Enbridge representatives entered the 7 areas via airboat. On October 23, 2010, site MP 36.5 to 37.5 was cleared and received final sign-off.

Attachment Descriptions

The ensuing information listed below directly follows in this Submerged Oil Recovery Summary Report:

- USEPA and Enbridge signed Submerged Oil Remediation Status Tracking Form.
 - Contains signatory approvals.
- Site Summary
 - Provides information used by the field teams to better understand site specific characteristics of the priority locations and determined the most appropriate recovery technology. Information included site layout, areal extent, depth to water, sediment thickness, sediment bed type, data collected, habitat description and habitat quality, containment measures, access, and recommendations.
- Pre- and Post- Submerged Oil Recovery Figures
 - Presents qualitative pre- and post- poling data in a graphical format.
- Photographs
 - Provides visual documentation of pre- and post- submerge oil recovery activities.

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 10/22/10

EPA(REP):

#

ENBRIDGE(REP): Nolan Taylor/David Hoekstra

LOCATION
(Division/Sect/MP)

Delta Area 1

CLEANUP METHODS USED

Method: Water flushing Notes: Flushed a total of 10 cells

Method: Notes:

Method: Notes:

OIL COLLECTION METHODS USED

Method: Sorbent boom, sorbent pads

Method: sweeps

DISCERNABLE OIL
OBSERVED (end of day) no

Sheen(heavy, medium, light) no Globules no

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): YES

Team Lead: Nolan Taylor/ David Hoekstra

Remediation Complete

SITE APPROVAL

Name

Signature

Date

EPA:

PAUL PERONFAD

Signature

10/23/2010

Enbridge:

Scott Swiech

Signature

10/23/2010



MAF #1

accurate up to 10-20-2010
changes made on 10-21-2010

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 10/23/10

EPA(REP): #

ENBRIDGE(REP): Nolan Taylor/David Hoekstra

LOCATION
(Division/Sect/MP) Delta Area 2

CLEANUP METHODS USED

Method: Water flushing Notes: Flushed a total of 5 cells

Method: Notes:

Method: Notes:

OIL COLLECTION METHODS USED

Method: Sorbent boom, sorbent pads

Method: sweeps

DISCERNABLE OIL
OBSERVED (end of day) no

Sheen(heavy, medium, light) no Globules no

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): YES

Team Lead: Nolan Taylor/David Hoekstra

Remediation Complete

SITE APPROVAL Name

Signature

Date

EPA: PAUL PERONARD

Enbridge: Scott Swick

Signature

10/23/2010
10/23/2010

MAP #1



accurate up to 10-20-2010
changes made on 10-21-2010

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 10/22/10

EPA(REP): #

ENBRIDGE(REP): David Murphy/Shawn Dekker

LOCATION
(Division/Sect/MP) Delta Area 3

CLEANUP METHODS USED

Method: Water flushing Notes: Flushed a total of 11 cells

Method: Notes:

Method: Notes:

OIL COLLECTION METHODS USED

Method: Sorbent boom, sorbent pads

Method: sweeps

DISCERNABLE OIL
OBSERVED (end of day) no

Sheen(heavy, medium, light) no Globules no

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): YES

Team Lead: David Murphy/Shawn Dekker

Remediation Complete

SITE APPROVAL

Name

Signature

Date

EPA:

PAUL PERONARD

10/23/2010

Enbridge:

Scott Swerch

Scott Swerch

10/23/2010



Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 10/21/10

EPA(REP): #

ENBRIDGE(REP): David Murphy/Shawn Dekker

LOCATION
(Division/Sect/MP) **Delta Area 4**

CLEANUP METHODS USED

Method: Water flushing Notes: Flushed a total of 24 cells

Method: Air rake Notes: In cells: 1-5, 6,8

Method: Notes:

OIL COLLECTION METHODS USED

Method: Sorbent boom, sorbent pads

Method: sweeps

DISCERNABLE OIL
OBSERVED (end of day) no

Sheen(heavy, medium, light) no Globules no

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): **YES**

Team Lead: David Murphy/Shawn Dekker

Remediation Complete
SITE APPROVAL

Name

Signature

Date

EPA:

PAUL PERONARD

Enbridge:

Scott Seuech

Signature of Scott Seuech

10/23/2010
10/23/2010



Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 10/23/10

EPA(REP):

#

ENBRIDGE(REP): David Murphy/Shawn Dekker

LOCATION
(Division/Sect/MP)

Delta Area 6

CLEANUP METHODS USED

Method: Water flushing Notes: Flushed a total of 2 cells

Method: _____ Notes: _____

Method: _____ Notes: _____

OIL COLLECTION METHODS USED

Method: Sorbent boom, sorbent pads

Method: sweeps

DISCERNABLE OIL
OBSERVED (end of day) no

Sheen(heavy, medium, light) no Globules no

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): **YES**

Team Lead: David Murphy/Shawn Dekker

Remediation Complete

SITE APPROVAL

Name

Signature

Date

EPA:

Paul R Penorand

Enbridge:

Scott S. Seach

AM
Scott S. Seach

10/24/2010

10/23/2010

AREA 6

AREA 6

MP 39.50



Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 10/23/10

EPA(REP): #

ENBRIDGE(REP): David Murphy/Nolan Taylor

LOCATION
(Division/Sect/MP) Delta Area 7

CLEANUP METHODS USED

Method: Water flushing Notes: Flushed a total of cells

Method: Notes:

Method: Notes:

OIL COLLECTION METHODS USED

Method: Sorbent boom, sorbent pads

Method: sweeps

DISCERNABLE OIL
OBSERVED (end of day) no

Sheen(heavy, medium, light) no Globules no

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): YES

Team Lead: David Murphy/Nolan Taylor

Remediation Complete

SITE APPROVAL Name

Signature

Date

EPA:

PAUL PERDANAD

Enbridge:

Scott Sepech

Signature

10/23/2010
10/23/2010



Plot 7A
MP 37.50



Area 7B
ml 37.50

2

1



SITE SUMMARY – MP 36.50 TO 37.50 (MORROW LAKE DELTA)

The information provided below shall be used by the field teams to better understand site specific characteristics of the priority locations and determine the most appropriate recovery technology.

Site Location:	MP 36.50 to 37.50 (Morrow Lake Delta)
Site Layout:	See Figure Attached
Description and Geomorphic Setting:	Delta area on northern end of Morrow Lake, with several islands.
Approximate Areal Extent:	~40 acres
Approximate Depth of Water:	0 to 1 ft. Slightly deeper in channels between vegetated islands
Sediment thickness:	0 to 1 foot
Bed type:	Soft sediment over sand
Data Collected:	
Poling (Y/N)	Y
Cores (Y/N)	Y
Lab analysis (Y/N)	Y
Community Description and Habitat Quality:	High quality habitat. The islands themselves are dominated by purple loosestrife so they have limited wildlife habitat value. The islands do provide cover for fish; however, the fish hang along the edges. The deeper water (2 to 3 feet deep) provides excellent habitat for adult fish.
Containment:	Surface containment and X-Tex at bottom end of delta. Additional containment and absorbent boom to be deployed as directed by EPA to ensure effective submerged oil recovery collection. The EPA and Enbridge will develop containment strategies for each site to allow capture of released product and protection of vegetation and shorelines. All booming activity will follow the containment strategy depicted on the maps of the Delta. Please see the attached map for site specific booming locations.
Access Issues:	None, Submerged Oil will use launch E4 to access the delta.
Miscellaneous:	Morrow Lake Delta
Recommendations:	<p>ECO: The purple loosestrife islands can be impacted if necessary but efforts should be maintained to retain the root mass as an anchor for sediment. Impacts to the channel itself should be avoided if possible. If dredging is required mitigation may be required for the open water habitat.</p> <p>SOTF: Recommend that reasonably aggressive steps be taken to remove the oil. The technique employed would rely primarily on aeration, but may also include sediment skimming, flushing, raking or a combination of these.</p>
Recovery Techniques:	<p>Several areas in the Morrow Lake Delta have been identified as high priority areas where Operations will attempt to recover as much submerged oil as possible. The EPA has specified that the sites are to be treated in the following sequence: 4,1,2,6,3,7A, 7B. Please see the attached map for the areas identified for recovery. It was determined by EPA and Enbridge that sites 5, 7C, 7D, 7E, and 7F do not need remediation.</p> <p>At each location Operations will agitate the sediments to release the submerged oil and allow for its recovery. The primary agitation methods will be raking, flushing, and aeration depending on the conditions at each location as described in the operating SOP for Submerged Oil Recovery . Flushing of the dry access areas will be by perforated pipes (i.e., wands), high volume, low pressure "trash" pumps and hoses with diffuser nozzles.</p>

Operations will establish several collection points at each location to contain and capture free floating oil in accordance with the Oil Recovery and Containment Plan. In addition to the use of sorbent boom, leaf blowers, sorbent pads and skimming nets may be used as necessary. All recovered oil and waste will be disposed of in accordance with the Waste Treatment, Transportation, and Disposal Plan.

Site Specific Operations

Site 1:

- Shoreline will be protected by creek boom and/or silt fencing to prevent shoreline contamination of remobilized oil.

Site 2:

- Aeration will be utilized along the southern channel.
- Raking and/or flushing will be used in shallower Northwest portion of site.
- Boom will be set to prevent oil movement around island in south portion of site.

Site 3:

- Shoreline will be protected by creek boom and/or silt fencing to prevent shoreline contamination of remobilized oil.

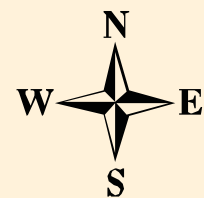
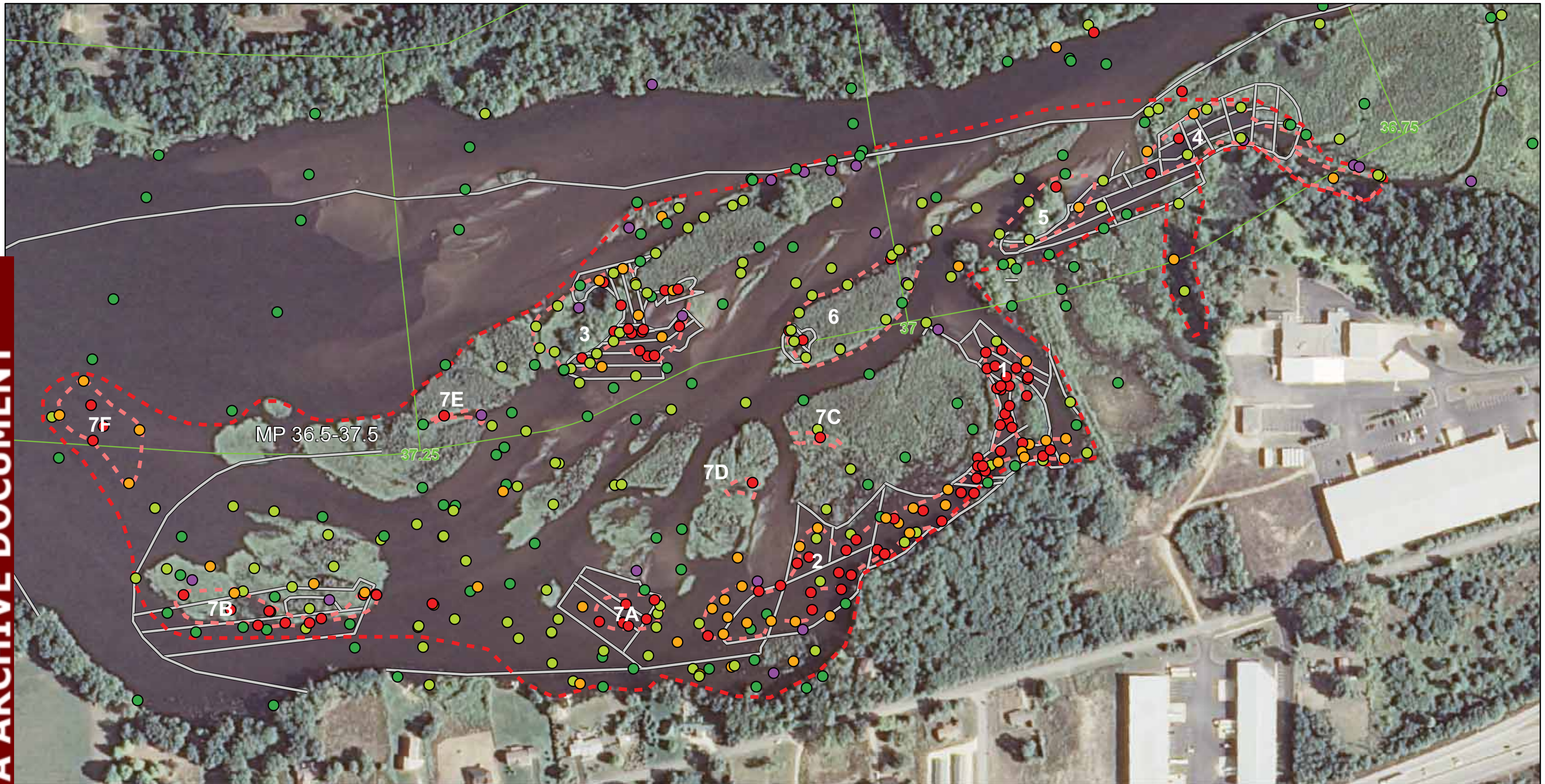
Sites 4,6 and 7

- No site specific issues beyond what has been included in the work plan.

Operations will be conducted in an environmentally friendly manner. The Morrow Lake Delta is critical habitat for both terrestrial and aquatic life. Operational activities will be conducted so as to minimize the impact these activities will have on the environment.

A site safety plan should identify the specific safety equipment required for the specific work site.

These operational strategies are subject to change based on decisions made by the Submerged Oil Task Force and the EPA. All oil recovery operations will follow procedures in the *Standard Operating Procedure for Submerged Oil Recovery*.



0 250 500
1 inch = 250 feet

Legend

Pre Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy
- Observed But Quantity Not Noted

Priority Areas

Submerged Oil Delineation Area

Priority Area Approximate Containment (if known)

Division Quarter Mile Grid

**Poling Data Collected Through:
October 11, 2010**

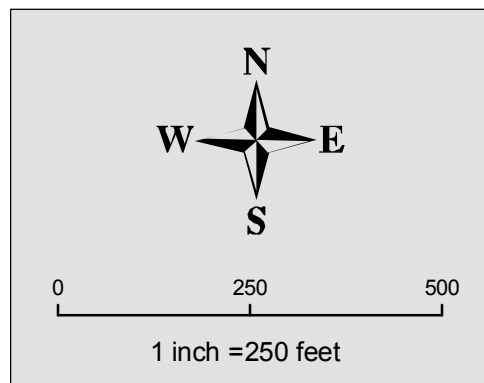
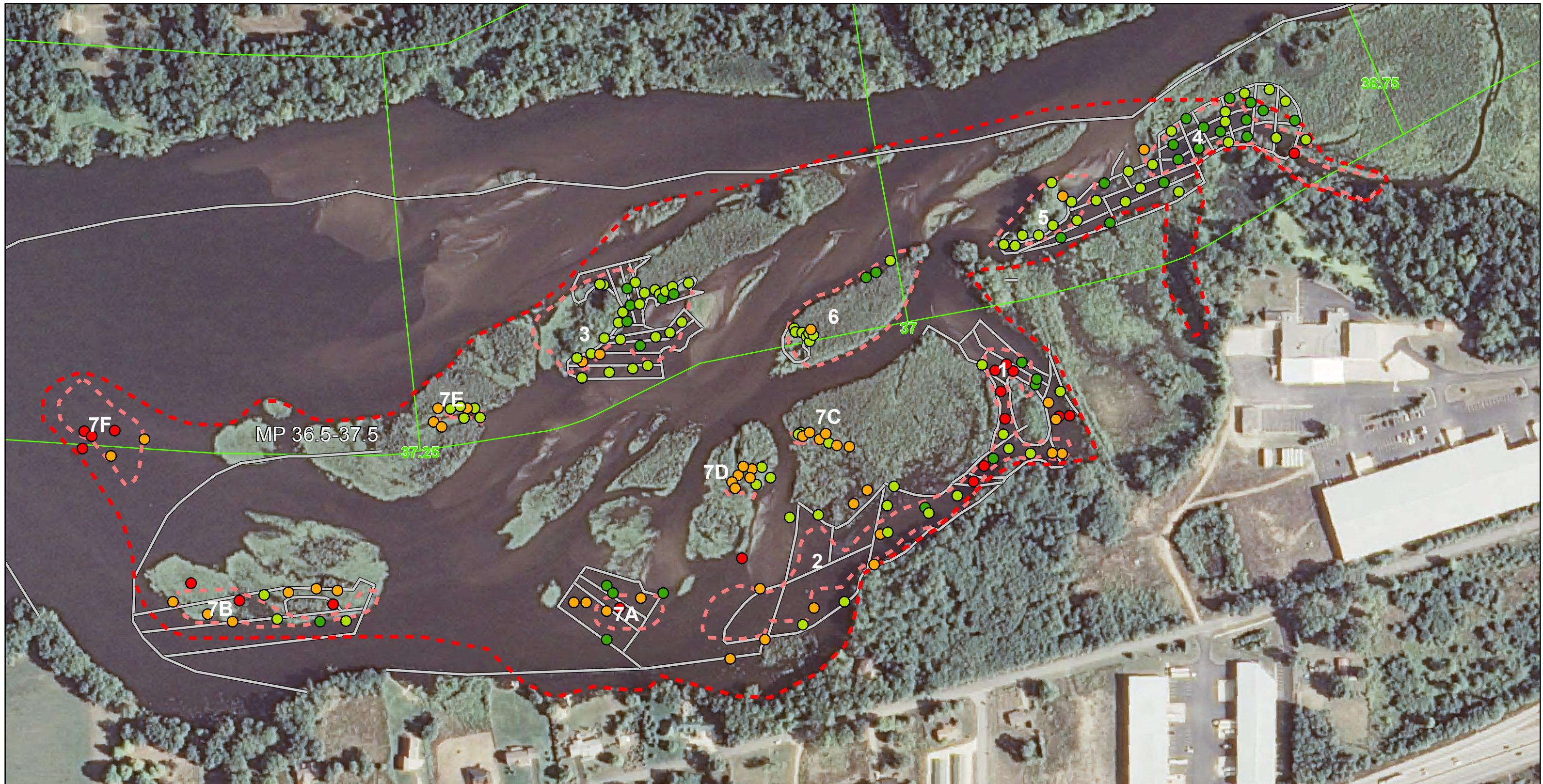
Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA PRE RECOVERY
QUALITATIVE RESULTS
Morrow Lake Delta**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 25, 2010





Legend

Post Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy

Priority Areas

Submerged Oil Delineation Area

Priority Area Approximate Containment (if known)

Division Quarter Mile Grid

Poling Data Collected Through:
October 28, 2010

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

PRIORITY AREA POST RECOVERY QUALITATIVE RESULTS Morrow Lake Delta

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 28, 2010



PHOTOGRAPH LOG

Photograph 1

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
37 to 37.50
Morrow Lake Delta
Area 1

Date:
10/22/10

Description:
Recovery activities in
progress – water washing

View Direction:



PHOTOGRAPH LOG

Photograph 2

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
37 to 37.50
Morrow Lake Delta
Area 2

Date:
10/22/10

Description:
Recovery activities in
progress – water washing

View Direction:



PHOTOGRAPH LOG

Photograph 3

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
37 to 37.50
Morrow Lake Delta
Area 3

Date:
10/23/10

Description:
Recovery activities in
progress - containment
and cell preparation

View Direction:



PHOTOGRAPH LOG

Photograph 4

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
37 to 37.50
Morrow Lake Delta
Area 4

Date:
10/23/10

Description:
Recovery activities in
progress - containment
and cell preparation

View Direction:



PHOTOGRAPH LOG
Photograph 5

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
37 to 37.50
Morrow Lake Delta
Area 6

Date:
10/23/10

Description:
Recovery activities in
progress - containment
and cell preparation

View Direction:

**PHOTOGRAPH LOG**
Photograph 6

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
37 to 37.50
Morrow Lake Delta
Area 7

Date:
10/22/10

Description:
Recovery activities in
progress – water washing

View Direction:



PHOTOGRAPH LOG
Photograph 7

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
37 to 37.50
Morrow Lake Delta
Area 4

Date:
10/26/10

Description:
Recovery activities
complete – containment
ready to be removed

View Direction:

**PHOTOGRAPH LOG**
Photograph 8

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
37 to 37.50
Morrow Lake Delta
Area 4

Date:
10/26/10

Description:
Recovery activities
complete – containment
ready to be removed

View Direction:



Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 10/23/10

EPA(REP): Paul Peronard #

ENBRIDGE(REP): Scott Swiech/Bryan Sederberg

LOCATION

(Division/Sect/MP)

MP 29.15

Site was inspected on 10/23 by Peronard, Scott Swiech and Bryan Sederberg. Based on their observations and the poling data provided by Tetrattech, they determined that at this time, no further recovery operations are required.

CLEANUP METHODS USED

Method: Notes:

Method: Notes:

Method: Notes:

OIL COLLECTION METHODS USED

Method:

Method:

DISCERNABLE OIL

OBSERVED (end of day) no

Sheen(heavy, medium, light) no Globules no

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): YES

Team Lead:

Site MP 29.15 was not identified as a Priority Site

Remediation Complete

SITE APPROVAL

Name

Signature

Date

EPA: PAUL PERONARD

Enbridge: SCOTT SWIECH

[Signature of Paul Peronard]
[Signature of Scott Swiech]

10/23/2010

10/23/2010

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 10/23/10

EPA(REP): Paul Peronard

#

ENBRIDGE(REP): Scott Swiech/Bryan Sederberg

LOCATION

(Division/Sect/MP)

MP 30.75

Site was inspected on 10/23 by Peronard, Scott Swiech and Bryan Sederberg. Based on their observations and the poling data provided by Tetratex, they determined that at this time, no further recovery operations are required.

CLEANUP METHODS USED

Method: Notes:

Method: Notes:

Method: Notes:

OIL COLLECTION METHODS USED

Method:

Method:

DISCERNABLE OIL

OBSERVED (end of day) no

Sheen(heavy, medium, light) no Globules no

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): YES

Team Lead:

Site MP 30.75 was not identified as a Priority Site

Remediation Complete

SITE APPROVAL

Name

Signature

Date

EPA:

Paul R. Peronard

Enbridge:

Scott Swiech

Signature of Scott Swiech

10/23/2010

10/23/2010

Talmadge Creek/Kalamazoo River Submerged Oil Remediation STATUS TRACKING FORM

DATE: 10/23/10

EPA(REP): Paul Peronard

#

ENBRIDGE(REP): Scott Swiech/Bryan Sederberg

LOCATION

(Division/Sect/MP)

MP 37.75

Site was inspected on 10/23 by Peronard, Scott Swiech and Bryan Sederberg. Based on their observations and the poling data provided by Tetrattech, they determined that at this time, no further recovery operations are required.

CLEANUP METHODS USED

Method: Notes: 1

Method: Notes:

Method: Notes:

OIL COLLECTION METHODS USED

Method:

Method:

DISCERNABLE OIL

OBSERVED (end of day) no

Sheen(heavy, medium, light) no Globules no

SITE RECOMMENDED FOR FINAL INSPECTION/APPROVAL (Yes/no): YES

Team Lead:

Site MP 37.75 was not identified as a Priority Site

Remediation Complete

SITE APPROVAL

Name

Signature

Date

EPA:

Paul Peronard

10/23/2010

Enbridge:

Scott Swiech

Scott Swiech

10/23/2010

SITE SUMMARY – MP 37.75 NORTH

The information provided below shall be used by the field teams to better understand site specific characteristics of the priority locations and determine the most appropriate recovery technology.

Site Location:	MP 37.75 North
Site Layout:	See Figure Attached
Description and Geomorphic Setting:	Shoreline, right bank
Approximate Areal Extent:	~0.5 acres
Approximate Depth of Water:	2.5 to 3 feet
Sediment thickness:	0 to 0.5 feet
Bed type:	Sand and gravel
Data Collected:	
Poling (Y/N)	Y
Cores (Y/N)	Y
Lab analysis (Y/N)	Y
Community Description and Habitat Quality:	Not provided in Ecological Assessment Reports
Containment:	Containment boom and X-Tex curtain
Access Issues:	None
Miscellaneous:	N/A
Rec. Action:	ECO: Not provided in Ecological Assessment Reports SOTF: Less aggressive invasive action at this time. Cautious raking and flushing, taking care to avoid damage to existing vegetation.



Legend

Pre Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy
- Observed But Quantity Not Noted

Priority Areas

Submerged Oil Delineation Area

Priority Area Approximate Containment (if known)

Division Quarter Mile Grid

**Poling Data Collected Through:
September 8, 2010**

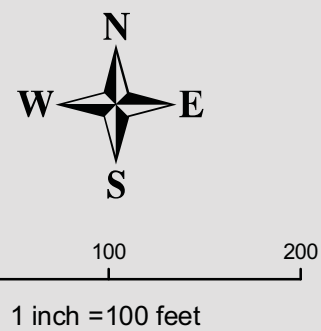
Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA PRE RECOVERY
QUALITATIVE RESULTS
MP 37.75 North**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 25, 2010





Legend

Post Recovery Poling Data

Observed Sheen/Globules After Poling

- None Observed
- Slight
- Moderate
- Heavy



Priority Areas



Submerged Oil Delineation Area



Priority Area Approximate Containment (if known)



Division Quarter Mile Grid

**Poling Data Collected Through:
October 23, 2010**

Coordinate System: Michigan State Plane South
Horizontal Datum: NAD83
Vertical Datum: NAVD88
Units: International Feet

**PRIORITY AREA POST RECOVERY
QUALITATIVE RESULTS
MP 37.75 North**

SUBMERGED OIL TASK FORCE
KALAMAZOO AND CALHOUN COUNTIES
MICHIGAN

Oct 26, 2010



TETRA TECH EC, INC.

PHOTOGRAPH LOG

Photograph 1

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
37.75 North

Date:
10/24/10

Description:
Site prepared but no
activity determined to be
needed

View Direction:
Facing west



PHOTOGRAPH LOG

Photograph 2

Project Name:
Enbridge Line 6B
Submerged Oil Task Force

Mile Post:
37.75 North

Date:
10/24/10

Description:
Site prepared but no
activity determined to be
needed

View Direction:
Facing west



Appendix A

USEPA START Ecological Assessment Results for Each Priority 1 and 2 Location,
September 2010

Table 1. Ecological Assessment Results for Each Priority 1 and 2 Location of Concern,
Kalamazoo River Submerged Oil Task Force,
September 2010.

River Mile Location	Priority Ranking	Description and Geomorphic Setting	Community Description and Habitat Quality	Recommendations
5.55	1	Shallow cove on right bank, looking downstream. Located upstream of Ceresco Dam.	High quality habitat has been impacted. Aquatic beds dominated by <i>Peltandra</i> and <i>Nymphaea</i> have been cut. Water depth less than 12 inches. Potential fish spawning habitat for grass pickerel, Northern pike and other grass spawners. Turtle habitat and green frog observed. Also habitat for wading birds, shorebirds, rails, waterfowl and muskrat.	Environmental Concern. Area has already been impacted by clearing of vegetation. Area may be dredged to address remaining oil, but mitigation will be required by DNRE as high quality habitat has been impacted.
5.63	1	Shallow cover on left bank looking downstream. Location of aeration trials upstream of Ceresco Dam.	High quality habitat has been impacted. Aquatic beds dominated by <i>Peltandra</i> and <i>Nymphaea</i> have been cut. Remnant vegetation includes <i>Sparganium</i> , Water depth is 6 inches over dark silt. Some large (half-dollar sized) snails noted on the bottom. Potential fish spawning habitat for grass pickerel, Northern pike and other grass spawners. Turtle habitat and green frog observed. Also habitat for wading birds, shorebirds, rails, waterfowl and muskrat.	Environmental Concern. Due to the extent of oil sheen observed in this area, dredging may be unavoidable. DNRE will require mitigation for disturbance to the marsh, which shows up much larger on aerial photos than existing.
5.75 (Ceresco Dam - North)	1	Shoreline area on right bank looking downstream. An additional area exists at MP 5.5 on the right bank looking downstream. Both areas are upstream of Ceresco Dam.	High quality habitat has been impacted. Emergent aquatic vegetation beds dominated by <i>Pontedaria</i> have been mowed. Water depth 18 inches above dark silt. The area provides juvenile and adult fish feeding habitat for largemouth bass and sunfishes. It also provides waterfowl and wading bird habitat. Second area on the right bank has cut vegetation and water depth of 6 inches. The aquatic bed formerly consisted of water lilies (probably <i>Nymphaea</i>), and <i>Sparganium</i> . Submerged aquatics such as <i>Ceratophyllum</i> and <i>Potamogeton</i> are still present.	Environmental Concern. This area has already been impacted and if dredged would require mitigation. If possible, these and the two areas above should be allowed to regenerate, with dredging limited to the channels and open water areas.

Table 1. Ecological Assessment Results for Each Priority 1 and 2 Location of Concern,
Kalamazoo River Submerged Oil Task Force,
September 2010.

River Mile Location	Priority Ranking	Description and Geomorphic Setting	Community Description and Habitat Quality	Recommendations
7.75	2	Overflow channel on left side of river looking downstream.	Channel is 50-60 ft wide at the base with about 15 inches of water over a turbid dark brown substrate that is firmer than most depositional areas. Main channel of the river is shallow (2-6 inches deep) underlain by gravel and cobbles. Coarse woody debris present. This area is habitat for frogs (heard) and a nursery area for young smallmouth, minnows and shiners. Surrounding vegetation is forested on the bank with silver maple (<i>Acer saccharinum</i>), green ash (<i>Fraxinus pennsylvanica</i>), and basswood (<i>Tilia americana</i>).	No major ecological concerns associated with disturbance of the overflow channel. There was little sheen noted during the 14 September 2010 field visit so the area may be cleansing itself. Care should be taken if the site is accessed over land to avoid disturbance to riparian vegetation, wetlands and streambank areas.
12.5	2	Oxbow Channel on right bank facing downstream.	High quality aquatic habitat. This channel is approximately 120 feet wide at its lower confluence with the mainstem of the river and about 3 feet deep underlain by dark silt. This area provides habitat for juvenile and adult small mouthed bass, minnows and shiners, and there appears to be a mussel bed nearby (a mussel cache was seen on the bank, deposited from a raccoon). Coarse woody debris is present, providing habitat for turtles and frogs. There are thick beds of submerged aquatic vegetation dominated by <i>Potamogeton</i> that provide food for waterfowl, herbivorous mammals and cover for fish. A duck blind is present, so it is assumed waterfowl use the area. Rice cutgrass (<i>Leersia</i>) grows along the banks. Surrounding palustrine forest is thick mature silver maple.	Environmental Concern. High quality habitat present. Dredging is not recommended at this location. Care should be taken not to disturb the submerged aquatic vegetation beds dominated by <i>Potamogeton</i> or the bank vegetation dominated by <i>Leersia oryzoides</i> .

Table 1. Ecological Assessment Results for Each Priority 1 and 2 Location of Concern,
Kalamazoo River Submerged Oil Task Force,
September 2010.

River Mile Location	Priority Ranking	Description and Geomorphic Setting	Community Description and Habitat Quality	Recommendations
15 to 15.25	1	Wetlands located along the margin of the Mill Pond just north of and upstream of Burnham Street bridge;	High quality habitat. Large wetland covered with <i>Peltandra</i> , <i>Pontedaria</i> and lily pads (<i>Nymphaea</i>). Open water areas are interspersed and consist of shallow (6 inches on average) water over dark brown silt. These areas collectively provide spawning and nursery habitat for pike, pickerel, sunfish, minnows, shiners, and others. They are used by waterfowl and piscivorous birds such as osprey, kingfishers, and herons, all of which were seen in the field. They are also used by shorebirds and rails. The higher elevation areas along the edge are dominated by reed-canary grass (<i>Phalaris arundinacea</i>) and purple loosestrife (<i>Lythrum salicaria</i>), both exotic invasives.	Environmental concern. This area is high quality habitat and highly sensitive to disturbance. Dredging should be avoided if possible, particularly within areas of emergent wetland vegetation. The reed-canary grass and purple loosestrife can be cut or removed if necessary, as they are exotics. Removal of these species could also be used for mitigation of impacts elsewhere. Recommend agitation or similar means to remove the oil from these sediments.
15.25 to 15.5	1	Additional backwater depositional area just south of bridge at 42.3079, 85.188. These two wetlands are part of a single system connected hydraulically by the river and separated only by the bridge.	High quality habitat. This area is essentially a continuation of the wetland described above that is north of the bridge.	Environmental Concern. Same recommendation as described above for 15 to 15.25.
21.5	1	Oxbow, open water meander with constriction that makes it depositional 411.21065, 85.16557	Fairly high quality habitat within the oxbow. Mostly open water area, but margins contain <i>Peltandra</i> in some areas. Habitat for both fish and waterbirds.	Environmental Concern. However impacts to this area could easily be avoided by avoiding disturbance to vegetated areas.

Table 1. Ecological Assessment Results for Each Priority 1 and 2 Location of Concern,
Kalamazoo River Submerged Oil Task Force,
September 2010.

River Mile Location	Priority Ranking	Description and Geomorphic Setting	Community Description and Habitat Quality	Recommendations
26	1	Backwater pool on right side of river facing downstream.	Shallow backwater inlet about an acre in extent, surrounded by palustrine forest on two sides, and a residence on the third. A portion is mudflat. Water depth is 6 inches or less, overlying dark organic silt. Sparse vegetation; mostly purple loosestrife where any is present. Some refuge habitat for juvenile fish, but looks like anoxic conditions. Drift line of wood and trash created by owner. Some wood frog habitat toward the head of the inlet.	No major environmental concerns. In fact, this site could benefit from restoration/enhancement. Candidate mitigation site.
26.25	1	Small cove on the right side of the bank looking downstream.	Shallow cove about 0.75 acre in extent. Some sharp-stemmed bulrush on one side, but most is open water about 12 inches deep over silt. Coarse woody debris present. Narrow shoreline mudflat with spotted sandpiper foraging on it. Mudflat in the middle about 50x100 ft in extent. Refuge habitat for juvenile fish; hundreds of small fish about a half inch in size. Some concrete on shoreline. Riparian forest surrounds on three sides.	Not a major environmental concern. Future oil extraction efforts should keep the area shallow. Potential candidate mitigation site for enhancement.
26.65	1	Cove area on the right side, outside of the curve, looking downstream.	Cove area surrounded by palustrine forest wetland on two sides and residences on another. This area is mostly a mudflat, with a small amount of open water on the river side abutting the existing boom. Water depth is 0-6 inches. Twenty-foot wide margin of emergent vegetation (<i>Peltandra</i> , <i>Pontedaria</i> , <i>Sagittaria</i>), with some purple loosestrife on mudflat on the river side. Nearby wet meadow located above the bank has high floristic diversity. Not much fish habitat under normal flow conditions.	Environmental concerns limited to the narrow margin of emergent vegetation, which should be avoided during submerged oil clean-up activities. Nearby wet meadow should be avoided if this area is accessed via over land.
27.9	1	Meander with depositional bar; mudflat area on right side looking downstream N42 20.467 W85 20.156	Unvegetated mudflat; narrow scattered fringe of willows abruptly transitioning to palustrine forest dominated by mature silver maple. Fish noted in margins along the river's edge (juvenile largemouth bass and minnows).	No major environmental concerns. This area receives continual deposition of sediments, so spot dredging would be acceptable if required.

Table 1. Ecological Assessment Results for Each Priority 1 and 2 Location of Concern,
Kalamazoo River Submerged Oil Task Force,
September 2010.

River Mile Location	Priority Ranking	Description and Geomorphic Setting	Community Description and Habitat Quality	Recommendations
28-28.25	1	Oxbow; deep channel with depositional area adjacent 42.20361, 85.20159 to 42.20282 to 85.20237	The channel is inundated over about half its area, and the remainder is dark brown mudflat. Areas that are inundated are currently stagnant with little flow. Some nursery and potential refuge habitat for fish. Also habitat for frogs and reptiles, but none seen. Adjacent palustrine forest is a high quality habitat that contains depressions. One is dominated by <i>Peltandra</i> , and the other is a wet meadow with high floristic diversity, including several rare or high quality native species (lizard-tail, false dragon's head, <i>Sium suave</i> and others).	No major environmental concerns associated with the oxbow channel itself – any impacts from dredging could be mitigated. Avoid disturbance to adjacent high quality palustrine forest and low areas within it.
30	2	Northeast Inlet 42.34907, 85.358334	Open water inlet, with no submerged or emergent vegetation. Water depth is 2-4 inches, overlaying about 2 to 4 feet of unconsolidated dark silty sediment. Amphibian habitat along the edge, but otherwise not a large amount of aquatic habitat. Surrounding forest is largely silver maple with some ash.	No major environmental concerns. The sediment could be dredged or otherwise disturbed. The adjacent palustrine forest should be avoided.
30.25	1	Small inlet on right side looking downstream, just downstream of the boat launch at E2. 42.3235107, 85.363912	Shallow cove with no emergent or aquatic vegetation. Water depth is 1 to 3 feet. Some coarse woody debris with turtles present (1 map turtle, 1 softshell turtle). Fish habitat is primarily associated with the river channel. Adjacent palustrine forest is primarily silver maple and ash.	No major environmental concerns, but impacts to turtles and coarse woody debris should be avoided.
30.25 south	2	Small Inlet on N. Bank headed NE 42.3179, 85.3697	Similar to 30.25 above.	Similar to 30.25 above.
33	1	Backwater area on right side looking downstream; two depositional coves 42.29678, 85.3868	Cove with stagnant open water 6-12 inches deep. Some dead branches in the water. Area is surrounded by palustrine forest. Juvenile fish nursery habitat and refuge habitat, although none seen here. Amphibian habitat along the edge. A significant 20-acre cattail marsh extends to the east.	No major environmental concerns. Aeration or some sediment removal would be acceptable, but the shallow depth should be maintained.
33.25	2	Backwater channel on the right side looking downstream, with island.	Backwater channel is open water and shallow, with no vegetation, overlying silty bottom. Tiny juvenile fish observed. Surrounded by palustrine forest dominated by silver maple.	No major environmental concerns. Could stand disturbance to the channel itself, similar to other shallow coves on the river.

Table 1. Ecological Assessment Results for Each Priority 1 and 2 Location of Concern,
Kalamazoo River Submerged Oil Task Force,
September 2010.

River Mile Location	Priority Ranking	Description and Geomorphic Setting	Community Description and Habitat Quality	Recommendations
36.25	2	Overflow channel on left side when facing downstream, adjacent to two residences	High quality habitat. This large backwater channel contains excellent quality aquatic habitat for fish, waterfowl and aquatic and semi-aquatic mammals. Water depth is about 2 to 3 feet over much of the channel, and is slow moving with a fine sand and silt bed. It is excellent habitat for spawning sunfish and largemouth bass. There are extensive beds of aquatic vegetation such as <i>Potamogeton natans</i> and <i>Potamogeton pectinatus</i> that provide cover for fish and food for waterfowl. A 7" long sunfish was observed. Further downstream within the inlet there is a logjam with a high diversity of wetland plant species. On the downstream side of the island formed by the channel is an emergent wetland dominated by <i>Peltandra</i> .	Environmental Concern. This channel will have to be dealt with carefully to avoid impacts to aquatic plants and animals. Dredging should be avoided and any resuspension activities should avoid impacting the submerged aquatic vegetation beds and be cordoned off with a silt curtain that will minimize impacts to fish.
36.5 to 36.75	2	Backwater area on right side of river facing downstream	High quality habitat. Extensive 10-acre wetland area with a variety of wetland habitat types interspersed. These include an open water area that is about 2 feet deep and provides excellent fish habitat. In addition there is a wetland margin dominated by Spatterdock that intergrades with <i>Peltandra</i> and other emergents around the margin. At higher elevations swamp dock, silky dogwood and some purple loosestrife are found. The area provides excellent habitat for waterfowl, water birds such as rails, herons, and sand-hill cranes (4 were seen flying from the marsh). In addition it provides habitat for muskrat and mink, as well as reptiles and amphibians.	Environmental Concern. This area was characterized as a Priority 2, indicating further investigation is required. If warranted, this area should be addressed by agitation with care not to impact the submerged or emergent aquatic vegetation.

Table 1. Ecological Assessment Results for Each Priority 1 and 2 Location of Concern,
Kalamazoo River Submerged Oil Task Force,
September 2010.

River Mile Location	Priority Ranking	Description and Geomorphic Setting	Community Description and Habitat Quality	Recommendations
37 - 37.5	2	Delta area on northern end of Morrow Lake, with several islands.	High quality habitat. The islands themselves are dominated by purple loosestrife so they have limited wildlife habitat value. The islands do provide cover for fish, however, that hang along their edge. The deeper water (2 to 3 feet deep) provides excellent habitat for adult fish.	Environmental Concern. The purple loosestrife islands can be impacted if necessary but efforts should be maintained to retain the root mass as an anchor for sediment. Impacts to the channel itself should be avoided if possible. If dredging is required mitigation may be required for the open water habitat.

Appendix B

Standard Operating Procedures (SOP) for Submerged Oil Recovery

STANDARD OPERATING PROCEDURE
For
Submerged Oil Recovery
Enbridge Line 6B Pipeline Release

APPROVED: _____
(Name/Title)
DATE: _____

September 29, 2010
Rev. #7

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Submerged Oil Recovery SOP

Operations

1. Scope and Application

The purpose of the Submerged Oil Recovery Standard Operating Procedure (SOP) is to provide general guidance to the recovery operations of submerged oil resulting from the Enbridge Line 6B pipeline release in Marshall, Michigan. **This SOP addresses submerged oil recovery operations for the sites approved for treatment by the EPA.**

2. Prioritization of Sites for Submerged Oil Recovery

- 2.1. The scheduling of the sites for submerged oil recovery using sediment aeration will be prepared by Enbridge and the EPA.
- 2.2. Wildlife Management must clear the areas prior to starting work.

3. Site Preparation

- 3.1. Confirm the integrity of the hard containment and X-Tex or GeoTextile boom already in place.
- 3.2. Deploy sorbent boom along the entire shore side perimeter of the work area and any vegetation area to prevent contamination. This procedure can only be applied to the sites identified by the EPA and Enbridge.
- 3.3. Confirm that water depth is within operating guidelines for aeration (Section 5.0). The aeration unit with the modified diffuser panel can operate in a water depth range from a maximum 4 ft. to a minimum water depth of 8 inches.
- 3.4. If the water depth is less than the required 8 inches, a secondary method for oil recovery will be used (Section 6.0). If the water depth is greater than 4 ft., ensure the availability of long handled raking tools or chain drags to stir up the bottom sediment.
- 3.5. Grid the water area into 50 ft. linear runs from the shoreline to containment boom—to be dissected if runs are wider than 75 ft. Optimal area of the grid is 40ft. x 75ft.
- 3.6. On completion of each phase of work, the grid shall be staked with a green/red flagging tape marked with location, grid number and date. The green flags designate a successfully treated cell and the red flags designate cells requiring further treatment.
- 3.7. Do not park vehicles or equipment near a wetland.
- 3.8. Minimize foot traffic through wetland areas to minimize damage to native vegetation and soils.

4. Equipment & Manpower

- 4.1. Pond aeration unit with electric motor (explosion proof) with aluminum impeller.
 - Diffuser panel is required at water depths less than 4 ft.
 - Flotation Device 2.5ft (wide) by 4 ft. (long)
- 4.2. One airboat outfitted with a platform deck. Crew of 4, HAZMAT trained.

- 4.3. 2-3 Jon boats. Crew of 2/boat, HAZMAT trained. (3 boats are recommended in areas where the water current is strong, windy conditions, heavy undergrowth or shore side vegetation etc.)
- 4.4. Generator and electrical cords (max. cord length 40ft.)
- 4.5. Rope (3-4 sections of 40 ft. lengths max. each)
- 4.6. Sorbent boom to cover the shoreline perimeter of the work area.
- 4.7. Sorbent pads, mops, bucket etc. Quantities and types are dependent on the amount of oil and size of the remediation site.
- 4.8. Water skimming equipment may be required depending on the amount and condition of the oil released after the aeration. This equipment can remain at the main equipment staging area until it required.
- 4.9. Two or three hand held “leaf blowers”—gasoline powered.
- 4.10. Low pressure water hoses equipped with diffuser nozzles.
- 4.11. Two or three rakes.
- 4.12. Centrifugal pump with generator.

5. Aeration of the Submerged Sediments

- 5.1. **The US EPA has established a maximum soil impact depth of 6 inches for submerged sediment aeration for Enbridge Line 6B pipeline release.** This is controlled by the angle of the shaft (30 degrees) and the addition of the diffuser panel. **A diffuser is required at water depths of less than 4 ft.**
- 5.2. Ensure the integrity of both the hard and sorbent booms and X-Tex or GeoTextile curtain before starting work. Minimize boat traffic across the hard boom to avoid releasing product from the containment area.
- 5.3. At the discretion of the EPA/Enbridge team lead, additional sorbent boom may be added on the inside edge of the hard boom in the containment area.
- 5.4. Launch the self-propelled aeration unit from the bow of the boat.
- 5.5. Using the control ropes to guide the self-propelled aeration unit, move the unit to the first grid section to be treated. Start at the farthest point upstream from the air boat first and work back toward the boat.
- 5.6. Using the control ropes to guide the aerator, sweep the unit side to side approximately 10 ft. right and left of center. There will be a minimum of two passes per cell, one pass is defined as first an upstream sweep followed by a downstream sweep.
- 5.7. If there is no discernable oil on the surface, flag the cell as completed with a green flag and move to the next grid location and repeat the sweeping procedure.
- 5.8. Continue the process until the entire area has been “swept”.
- 5.9. If discernable oil is present after the second pass, recover the oil and proceed with a third pass.
- 5.10. If discernable is present after a third pass, additional sweeps can be conducted at the discretion of the team lead.

6. Secondary Methods for Oil Recovery (for red flag areas)

- 6.1. When the above aeration procedure cannot be used due to insufficient water depth, the areas will be manually water flushed, raked or a combination of both.
- 6.2. The EPA/Enbridge Team Lead will determine the appropriate secondary treatment technique to be used at each red flag cell.

6.3. *Flushing:*

- In areas identified by the Team Lead/EPA to be flushed, a high volume/low pressure water flush will be used.
- Utilizing the same grid pattern as installed for the aeration, systematically flush the red cell with water in a sweeping motion.
- Runoff from the flushing should be directed toward the collection area and sorbent boom lining the work area.
- This process should be repeated until there is no discernable oil visible released from the cell.
- Flag the cell as green.

6.4. *Raking:*

- In areas identified by the Team Lead/EPA to be flushed, use a hand held rake to gently agitate the bottom sediment to release submerged oil.
- Allow the released oil to surface.
- Direct any floating oil to the collection area and sorbent boom lining the work area.
- This process should be repeated until there is no discernable oil visible released from the cell.
- Flag the cell as green.

7. Recovery of Floating Oil

- 7.1. Using the Jon boats and hand held “leaf blowers”, direct the floating oil to one corner of the boomed work area. Select an area that has the lowest ecological complexity (if possible), and that is easily accessible as the oil collection area.
- 7.2. Using absorbent pads, mops etc. to collect and remove the recovered oil. In extremely contaminated areas, a skimmer may be required. Refer to Oil Recovery and Containment Plan for appropriate oil recovery procedures.

8. Decommissioning of Equipment and Waste Disposal

- 8.1. Oiled debris including the sorbent booms, pads, and other material used to collect the recovered oil will be disposed of in accordance with the Waste Treatment, Transportation and Disposal Plan.
- 8.2. The aluminum shaft and mechanical parts of the aeration unit should not be contaminated with oil as it operates below the surface. The unit can be rinsed off with fresh water and air dried at the equipment staging area.
- 8.3. The buoyancy control device is likely to be covered by a film of oil as it sits on the surface of the water. This device should be transported to the decontamination area and cleaned according to procedures.
- 8.4. The sorbent boom should be removed from the site if it has become saturated with oil or when it has been determined that no further aeration is required by the appropriate authorities. It should be disposed of according to oily waste disposal procedures.
- 8.5. The hard and sorbent boom should remain in place until the site has been designated as “clean” by the appropriate authorities.

9. Site Inspection and Final EPA Sign-Off

- 9.1. The Submerged Oil Team Lead, with agreement of the team EPA and Enbridge representatives, is responsible for identifying when a site is ready for the final inspection by the EPA.
- 9.2. Oil recovery activity at the identified site will be stopped for a forty eight (48) hour “wait” period. All hard and sorbent booms should remain in place during this period.
- 9.3. This information (i.e., recommended for final inspection/date) will be reported to the Submerged Oil Task Force (SOTF) as part of the daily briefing.
- 9.4. The Team Lead may observe the site conditions during this “wait” period.
- 9.5. After the 48 hr. “wait” period, an EPA and Enbridge representative will visually inspect the site recommended for final inspection.
- 9.6. Consistent with the Data Quality Objectives (DQO) for the project, the final inspection will be a qualitative assessment based on visual inspection for the presence of materials capable of producing a release of oil or sheen to navigable water.
- 9.7. The visual inspection and completion sign-off will follow the SOP for Remediation Completion for the Enbridge Oil Spill at Talmadge Creek Marshall, Michigan.
- 9.8. Residual contamination related to the release will be addressed as part of the long-term assessment and remediation efforts for the site using quantitative methods.

10. Safety Considerations

- 10.1. The site safety plan should identify the specific safety equipment required for that work site.
- 10.2. Safety goggles, hearing protection and sturdy work gloves are required for the workers on the air boat. Workers that will be operating the aeration unit and should not come into direct contact with free oil. All boats with aeration systems must have four gas monitors for continuous monitoring.
- 10.3. Workers on the Jon boats will be involved in recovering the floating oil so they are required to wear the appropriate PPE including coveralls, hearing protection (when working with the leaf blowers), gloves and eye protection.
- 10.4. Any worker assisting with the decommissioning and disposal of the sorbent boom and other oily waste/materials will require the appropriate PPE including coveralls, gloves and eye protection.
- 10.5. Appropriate personal flotation protection is required for all personnel working on the boats and near the water's edge.

ALL OPERATIONS AND TARGETS DESCRIBED IN THIS STANDARD OPERATING PROCEDURE (SOP) ARE SUBJECT TO CHANGE BASED ON THE FIELD OBSERVATIONS AND JUDGEMENT OF THE EPA AND THE ENBRIDGE FIELD SUPERVISOR.

Appendix C

Final List of Submerged Oil Sites for Operation and Maintenance Inspection Tracking as of
October 28, 2010

Final List of Submerged Oil Sites for Operations and Maintenance Inspection Tracking as of October 28, 2010																			
Division	Segment	Unique ID	Location (RDB, LDB, or Island)	Longitude	Latitude	Comment	GPS Coordinates**	Post Spill Baseline Description of Area	Last SOTF Observation Date	Code	Submerged Oil Team Recommendations	Tentative Inspection Frequency	Priority	Date of Last Inspection	Inspector	Cleanup Action Performed (Y/N)	Primary Cleanup Actions Performed	Observation	Actions Needed
B	Talmadge		Talmadge Source to I69	42.24170117	-84.97326188		270890.288N 12959106.693E	Talmadge Creek	10/24/2010		Continue to Monitor					Y	hydro vac and raking	Sign-off and Released: 10/17/10	
B	Talmadge		Talmadge I 69-15.5	42.25175372	-84.98681399		274580.255N 12955464.124E	Talmadge Creek	10/16/2010		Continue to Monitor					Y	raking	Sign-off and Released: 10/07/10	
B	Talmadge	SUB B4	Talmadge 15.5-Confluence	42.25186682	-84.98847266	SUB B4	274624.778N 12955015.376E	Talmadge Creek	10/17/2010		Continue to Monitor					Y	raking	Sign-off and Released: 10/07/10	
B	2.00-2.25	SUB B5	Tal/Kalamazoo Confluence	42.25715243	-84.99541952	SUB B5	276564.865N 12953149.042E	Talmadge Creek	--		Continue to Monitor					Y	water flushing	Sign-off and Released: 10/23/10	
Division C Group 1																			
C	2.50-2.75	2.55 R1	2.55 - North	42.25842611	-85.00223838	SUB 2.55	277042.863N 12951306.638E	Heavy submerged oil observed, Less than 1,500 square foot area.	9/21/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
C	2.50-2.75	2.6 R1	2.6 - North	42.25804914	-85.00303002	SUB 2.6	276907.111N 12951091.303E	Moderate-Heavy submerged oil observed. Tight to Shoreline. Less than 3,500 square foot area.	9/21/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
C	2.75-3.00	2.75 R1	2.75 North	42.25838841	-85.0044311	SUB 2.5	277033.615N 12950712.965E	Moderate to Heavy submerged oil observed.	9/20/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
C	2.75-3.00	2.8 L1	2.8 - South	42.25906068	-85.00642904	SUB 2.8	277282.696N 12950173.981E	Moderate-Heavy submerged oil observed. Tight to Shoreline. Less than 500 square foot area.	9/20/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
C	2.75-3.00	2.9 L1	2.9 - South	42.25938739	-85.00876626	SUB 2.9	277406.567N 12949542.209E	Moderate-Heavy submerged oil observed. Downstream of Island. Less than 3,500 square foot area.	9/21/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
C	3.00-3.25	3.15 L1	3.15 - South	42.25963242	-85.01212759	SUB 3.15	277502.816N 12948632.996E	Heavy submerged oil observed. Downstream of Island. Less than 2,200 square foot area.	9/21/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
C	3.25-3.50	3.30 L1	3.3 - South	42.2594565	-85.01616746	SUB 3.3	277447.120N 12947538.927E	Heavy submerged oil observed along shoreline. Less than 2,700 square foot area.	9/21/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
C	3.50-3.75	3.60 L1	3.6 - South	42.25862088	-85.0207665	SUB 3.6	277152.253N 12946291.619E	Moderate-Heavy submerged oil observed. Downstream of Island. Less than 2,200 square foot area.	9/21/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
C	3.50-3.75	3.75 L1	3.75 - South	42.25816223	-85.02404615	SUB 3.75	276992.033N 12945402.516E	Moderate-Heavy submerged oil observed. Downstream of Island. Less than 2,200 square foot area.	9/21/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	

Division	Segment	Unique ID	Location (RDB, LDB, or Island)				GPS Coordinates**	Post Spill Baseline Description of Area	Last SOTF Observation Date	Code	Submerged Oil Team Recommendations	Tentative Inspection Frequency	Priority	Date of Last Inspection	Inspector	Cleanup Action Performed (Y/N)	Primary Cleanup Actions Performed	Observation	Actions Needed
				Longitude	Latitude	Comment													
C	4.00-4.25	4.15 L1	4.15 - South	42.25902926	-85.02931118	SUB 4.15	277319.159N 12943979.754E	Moderate to Heavy submerged oil observed. Downstream of Island. Less than 3,500 square foot area.	9/22/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
C	4.25-4.50	4.30 L1	4.3 - South	42.25972118	-85.03446828	SUB 4.3	277582.330N 12942585.740E	Moderate to Heavy submerged oil observed. South and downstream of Island. Less than 4,000 square foot area.	9/23/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
C	4.50-4.75	4.55 L1	4.55 - South	42.2600408	-85.03914383	SUB 4.55	277708.875N 12941321.025E	Moderate to Heavy submerged oil observed. Less than 3,500 square foot area.	9/26/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
C	4.75-5.00	4.9 L1	4.9 - South	42.26321992	-85.04576596	SUB 4.9 L1	278881.754N 12939537.810E	Moderate submerged oil observed. Less than 2,700 square foot area.	10/1/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
C	4.75-5.00	4.9 R1	4.9 - North	42.26359689	-85.04478583	SUB 4.9 R1	279016.986N 12939804.215E	Moderate submerged oil observed. Less than 2,700 square foot area.	10/1/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
C	5.00-5.25	5.25 R1	5.25 - North	42.26555086	-85.04936603	SUB 5.25 R1	279739.042N 12938570.234E	Moderate submerged oil observed. Less than 5,000 square foot area.	10/2/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
C	5.50-5.75	5.55 R1	5.55 North	42.26825248	-85.05559233	SUB 5.55 R1	280737.257N 12936893.026E	Heavy submerged oil observed.Shallow cove on right bank. Located upstream of Ceresco Dam.	10/24/2010		Continue to Monitor					Y	aeration and water flushing	Seems to be a natural accumulation point for oil. High quality habitat has been impacted. Sign-off and Released: 10/07/10	
C	5.50-5.75	5.63 L1	5.63 South	42.26785667	-85.05739551	SUB 5.63 L1	280597.017N 12936403.800E	Heavy submerrged oil observed. Shallow cove on left bank looking downstream. Location of aeration trials upstream of Ceresco Dam.	10/24/2010		Continue to Monitor					Y	Dredging	High quality habitat has been impacted. Sign off and Released: 10/24 /10	
C	5.50-5.75	5.75 L1	5.75 South	42.26872998	-85.05789814	SUB 5.75 L1	280916.375N 12936270.373E	Heavy submerged oil observed. Shoreline area on left bank looking downstream.	10/19/2010		Continue to Monitor					Y	Dredging	High quality habitat has been impacted. Emergent aquatic vegetation beds. Sign-off and Released: 10/23/10	
C	5.50-5.75	5.75 R1	5.75 North	42.2693457	-85.05796097	SUB 5.75 R1	281140.886N 12936255.210E	Heavy submerged oil observed. Upstream of Dam; North side is about 0.5 acre depositional area.	10/19/2010		Continue to Monitor					Y	aeration and water flushing	High quality habitat has been impacted. Emergent aquatic vegetation beds. Sign-off and Released: 10/17/10	
C	5.50-5.75	5.75 R2	5.75 Northwest	42.27021902	-85.06017253	SUB 5.75 R2	281464.050N 12935659.268E	Heavy submerged oil observed. Upstream of Dam; North side is about 0.5 acre depositional area.	10/22/2010		Continue to Monitor					Y	Dredging	High quality habitat has been impacted. Emergent aquatic vegetation beds. Sign off and Released: 10/23 /10	
C	5.75-6.00	5.80 R1	5.8 North	42.27020645	-85.06100186	SUB 5.80 R1	281461.321N 12935434.772E	Heavy submerged oil observed. Downstream of Dam; Spillway Pond Area	10/21/2010		Continue to Monitor					Y	water flushing, draining, power washing	Sign-off and Released: 10/14/10	
C	5.75-6.00	5.80 L1	5.8 South	42.26979807	-85.061027	SUB 5.80 L1	281312.559N 12935426.743E	Heavy submerged oil observed. Downstream of Dam; Spillway Backwater Area	10/21/2010		Continue to Monitor					Y	aeration and water flushing	Sign-off and Released: 10/17/10	
C	5.75-6.00	5.90 R1	5.9 - North	42.27069651	-85.06316945	SUB 5.90 R1	281644.748N 12934849.597E	Moderate to heavy submerged oil observed.	9/27/2010		Inspect after boom has been removed					N		Oil collects at boom	

Division	Segment	Unique ID	Location (RDB, LDB, or Island)	Longitude	Latitude	Comment	GPS Coordinates**	Post Spill Baseline Description of Area	Last SOTF Observation Date	Code	Submerged Oil Team Recommendations	Tentative Inspection Frequency	Priority	Date of Last Inspection	Inspector	Cleanup Action Performed (Y/N)	Primary Cleanup Actions Performed	Observation	Actions Needed
Division C Group II																			
C	6.00-6.25	6.20 L1	6.2 -South	42.27255624	-85.06590249	SUB 6.20 L1	282328.572N 12934115.540E	Moderate to Heavy submerged oil observed. Less than 2,700 square foot area.	9/27/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient	
C	6.25-6.50	6.45 R1	6.45 - North	42.27657615	-85.06788698	SUB 6.45 R1	283797.916N 12933590.661E	Moderate to Heavy submerged oil observed. Less than 5,000 square foot area.	9/27/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient	
C	6.75-7.00	6.75 L1	6.75 - South	42.27640239	-85.07285424	SUB 6.75 L1	283745.833N 12932245.890E	Moderate to Heavy submerged oil observed. Approximately 300 square foot area.	9/27/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient	
C	6.75-7.00	7.0 L1	7.0 South	42.2749334	-85.07697346	SUB 7.0 L1	283219.905N 12931126.625E	South end of island; fast current; sand and cobble, little sheen.	10/2/2010		NA - Seasonal Spot Check					N		Low opportunity for remobilization.	
C	7.75-8.00	7.75 L1	7.75	42.27737294	-85.09111382	SUB 7.75 L1	284141.491N 12927307.511E	Heavy submerged oil observed. Sandy cobble area; already remediated, little sheen.	10/24/2010		Continue to Monitor					Y	aeration and raking	Sign-off and Released: 9/30/10	
Division C Group III																			
C	No Sites Currently Identified in Division C Group III																		
Division C Group IV																			
														10/14/2010					
C	12.25-12.50	12.50 R1	12.5	42.30467296	-85.1502726	SUB 12.50 L1	294233.051N 12911390.819E	Moderate to heavy submerged oil observed. Medium potential at the entrance (southern end) of the channel; some sheen. No oil on bank vegetation; SAV* present.	10/20/2010		Continue to Monitor			10/15/2010		Y	water flushing	Sign-off and Release 10/18/10	
C	13.75-14.00	13.80 L1	13.8 - South	42.29849509	-85.17097216	SUB 13.80 L1	292034.632N 12905770.162E	Heavy submerged oil observed. Less than 4,000 square foot area.	10/3/2010		NA - Seasonal Spot Check			10/16/2010		N			
C	14.75-15.00	14.75 R1	14.75	42.30245397	-85.18065425	SUB 14.75 R1	293502.424N 12903164.887E	Heavy submerged oil observed Overflow Channel	10/24/2010		Continue to Monitor			10/16/2010		Y	aeration and raking	Sign-off and Release 9/30/10	
C	14.75-15.00	14.90 L1	14.9 - South	42.30449295	-85.18577285	SUB 14.90 L1	294258.857N 12901787.511E	Moderate to Heavy submerged oil observed. Between Island and South Bank. Less than a 2,200 square foot area.	9/30/2010		NA - Seasonal Spot Check			10/16/2010		N		Degradation and bioattenuation expected to be sufficient treatment.	
C	15.00-15.25	15.00 R1	15			SUB 15.00 R1		Included with South Mill Pond area 15.25	10/18/2010					10/14/2010					
C	15.00-15.25	15.25 R1	15.25	42.3056022	-85.18620344	SUB 15.25 R1	294664.204N 12901674.970E	Heavy submerged oil observed South Mill Pond; large wetland covered with Pontedaria and lily pads. Additional backwater depositional area just south of bridge.	10/18/2010		Continue to Monitor			10/14/2010		Y	water flushing and aeration	Sign-off and Released: 10/18/10	
C	15.25-15.50	15.50 R1	15.5	42.30995967	-85.18734078	SUB 15.50 R1	296255.063N 12901382.808E	Heavy submerged oil observed. North Mill Pond Wetland/Backwater with Pontedaria and lily pad marsh	10/19/2010		Continue to Monitor			10/15/2010		Y	water flushing and raking	Sign off and Released: 10/18/10	

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Division D																			
D	18.00-18.25	18.15	18.15-South	42.33509817	-85.21996327	SUB-18.15	305503.228N 12892652.185E	Moderate to Heavy submerged oil observed adjacent to shoreline and boom	10/4/2010		Inspect after boom has been removed			10/10/2010		N		Degradation and bioattenuation expected to be sufficient treatment.	
D	18.25-18.50	18.50 L1	18.5 - South	42.33594065	-85.22616014	SUB 18.50 L1	305827.267N 12890979.919E	Moderate to Heavy submerged oil observed. Approximately 13,000 square foot area.	10/4/2010		NA - Seasonal Spot Check			10/10/2010		N		Degradation and bioattenuation expected to be sufficient treatment.	
D	18.75-19.00	18.80	18.8 - Center	42.33755071	-85.23313395	SUB 18.80	306433.298N 12889100.526E	Moderate submerged oil observed. Approximately 2.6 acres.	10/17/2010		NA - Seasonal Spot Check			10/10/2010		N		Degradation and bioattenuation expected to be sufficient treatment.	
D	19.25-19.50	19.45 R1	19.45 - North	42.34342463	-85.24205014	SUB 19.45 R1	308598.679N 12886712.277E	Heavy submerged oil observed. Less than 2,700 square foot area.	10/8/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
D	19.50-19.75	19.60 L1	19.6 - South	42.34321869	-85.24525623	SUB 19.60 L1	308532.664N 12885844.807E	Moderate to Heavy submerged oil observed. Approximately 13,000 square foot area.	10/6/2010		NA - Seasonal Spot Check			10/16/2010		N		Degradation and bioattenuation expected to be sufficient treatment.	
D	19.50-19.75	19.75	19.75 - Center	42.34376396	-85.24697335	SUB 19.75	308736.207N 12885382.699E	Moderate submerged oil observed. Less than 5,000 square foot area.	9/17/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
D	20.00-20.25	20.10 L1	20.1 - South	42.3449722	-85.25411227	SUB 20.10 L1	309196.748N 12883457.518E	Moderate to Heavy submerged oil observed. Approximately 17,500 square foot area.	10/6/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
D	20.00-20.25	20.30 L1	20.3 South	42.34548401	-85.25899617	SUB 20.30 L1	309397.205N 12882139.288E	Moderate submerged oil observed-very small area	10/6/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
D	20.50-20.75	20.60 L1	20.6 - South	42.34671262	-85.26327874	SUB 20.60 L1	309857.206N 12880986.405E	Moderate to Heavy submerged oil observed oil near the wastewater treatment plant outfall. Less than 2,700 square foot area.	10/6/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
D	20.50-20.75	20.70 R1	20.7 North	42.34841512	-85.26492859	SUB 20.70 R1	310482.346N 12880547.053E	Moderate-Heavy submerged oil observed ; small area-point bar off shoreline. Oil collect in vegetation along the shore	10/6/2010		NA - Seasonal Spot Check; Inspect after downstream boom has been removed					N		Degradation and bioattenuation expected to be sufficient treatment.	
D	20.75-21.00	20.9 L1	20.9 South	42.34866669	-85.26997174	SUB 20.90 L1	310588.603N 12879184.857E	Moderate submerged oil observed; adjacent to shoreline	10/6/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
D	21.00-21.25	21.25 R1	21.25			SUB 21.25 R1		Mouth of tributary-not depositional . No Oil observed since Sept 2010	--		No Further Action					Y		Degradation and bioattenuation expected to be sufficient treatment.	
D	21.25-21.50	21.50 R1	21.5	42.35132283	-85.27593341	SUB 21.5 R1	311573.837N 12877583.857E	Heavy submerged oil observed. Ox Bow	10/24/2010		Continue to Monitor			10/10/2010		Y	water flushing	High quality habitat has been impacted. Sign-off and Release 10/22/10	
D	22.00-22.25	22.15 L1	22.15 - South	42.35423638	-85.28728927	SUB 22.15 L1	312668.882N 12874526.089E	Moderate to Heavy Submerged Oil along left bank	10/6/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
D	22.00-22.25	22.20 R1	22.2 - North	42.35526022	-85.28806739	SUB 22.20 R1	313044.266N 12874319.864E	Moderate to Heavy submerged oil observed. Approximately 2,600 square foot area.	10/6/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
D	22.75-23.00	22.75 R1	22.75	42.35928213	-85.28921521	SUB 22.75 R1	314513.229N 12874025.698E	Ox bow channel. No oil seen since Sept 2010	9/20/2010		No Further Action			10/10/2010		N		Degradation and bioattenuation expected to be sufficient treatment.	

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Division E																			
E	23.00-23.25	23.15 R1	23.15-North	42.36063685	-85.29590708	SUB 23.15	315026.774N 12872222.632E	Moderate submerged oil observed --adjacent to shoreline	10/8/2010		NA - Seasonal Spot Check			10/15/2010		N		Degradation and bioattenuation expected to be sufficient treatment.	
E	24.50-25.75	24.75	24.75					Area not connected to river. Overbank issue?	--		No Further Action			10/15/2010		N		Degradation and bioattenuation expected to be sufficient treatment.	
E	25.25-25.50	25.50	25.5					No oil observed since Sept 2010	--		No Further Action			10/10/2010		N		Degradation and bioattenuation expected to be sufficient treatment.	
E	25.75-26.00	26.00 R1	26	42.3532886	-85.32131002	SUB 26.00 R1	312425.922N 12865327.148E	Heavy submerged oil observed. Backwater cove; depositional	10/7/2010		Continue to Monitor			10/10/2010		Y	aeration, water flushing and raking	Sign-off and Release 10/6/10	
E	26.00-26.25	26.1 L1	26.1 South/East	42.35303118	-85.32239237	SUB 26.10 R1	312335.437N 12865033.546E	Heavy submerged oil observed -very small area-shoreline	10/10/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	26.00-26.25	26.15 L1	26.15 South/East	42.35280411	-85.32238281	SUB 26.15 R1	312252.667N 12865035.190E	Moderate submerged oil observed -very small area-shoreline	10/10/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	26.00-26.25	26.25 R1	26.25	42.35231156	-85.32388425	SUB 26.25 R1	312077.795N 12864627.337E	Heavy submerged oil observed. Cutoff Channel; stagnant depositional area	10/13/2010		Continue to Monitor			10/14/2010		Y	aeration, water flushing and raking	Sign-off and Release 10/6/10 - 10/15/10	
E	26.25-26.5	26.3 R1	26.3 North/West	42.35135147	-85.32557565	SUB 26.3	311733.145N 12864166.193E	Heavy submerged oil observed -very small area-shoreline	10/10/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	26.25-26.50	26.40	26.4 - Center	42.35011177	-85.32617766	SUB 26.40	311283.259N 12863998.330E	Heavy submerged oil observed downstream end of the island. Less than 1,200 square foot area.	10/10/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	26.50-26.75	26.65 R1	26.65	42.34968468	-85.32930183	SUB 26.65 R1	311137.271N 12863152.105E	Heavy submerged oil observed. Open Water Meander	10/13/2010		Continue to Monitor					Y	aeration, water flushing and raking	Sign-off and Release 10/3/10	
E	26.75-27.00	26.8 L1	26.8 South/East	42.34812735	-85.32944334	SUB 26.8	310570.227N 12863107.367E	Moderate submerged oil observed-very small area-shoreline	9/22/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	27.00	27.10 R1	27.1 - North	42.34712565	-85.33102182	SUB 27.10 R 1	310210.097N 12862676.518E	Heavy submerged oil observed along right descending bank. Tight to shoreline. Less than 1,000 square foot area.	9/22/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	27.00-27.25	27.10 L1	27.1 - South	42.3469783	-85.33132755	SUB 27.10 L1	310157.348N 12862593.263E	Heavy submerged oil observed along left descending bank. Tight to shoreline. Less than 1,000 square foot area.	9/22/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	27.00-27.25	27.15 L1	27.15 - South	42.34756094	-85.33200477	SUB 27.15 L1	310371.760N 12862412.639E	Moderate submerged oil observed-small area.	9/22/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	27.25-27.50	27.3 L1, R1	27.3 - South & North	42.3460866138 (North) 42.3458986364 (South)	-85.335403921 (North) -85.3348780601 (South)	SUB 27.3	309845.077N 12861487.650E (North) 309774.944N 12861629.009E (South)	Moderate to Heavy submerged oil observed on south bank and heavy submerged oil on right bank.	9/22/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	27.50-27.75	27.65 L1, R1	27.65 South & North	42.342938587 (North) 42.3424826951 (South)	-85.3362343528 (North) -85.336094282 (South)	SUB 27.65	308700.540N 12861249.965E (North) 308533.980N 12861285.916E (South)	Moderate submerged oil observed along north and south bank.	9/22/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	27.25-27.50	27.50 L1	27.5 - South/East	42.344232	-85.33481594	SUB 27.50 L1	309167.439N 12861638.815E	Moderate to heavy submerged oil observed along left descending bank. Less than 9,000 square foot area.	9/22/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	27.50-27.75	27.75 R1	27.75			SUB 27.75 R1		Meander, No oil observed since Sept 2010	--		No Further Action					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	27.75-28.00	27.90 L1	27.9	42.34107857	-85.33610891	SUB 27.90 L1	308022.371N 12861276.071E	Heavy submerged oil observed.Meander with depositional bar	10/14/2010		Continue to Monitor					Y	water flushing and raking	Sign-off and Release 10/1/10	
E	28.00-28.25	28.15 L1	28.15 South	42.33842829	-85.33581053	SUB 28.15	307055.696N 12861345.614E	Moderate submerged oil observed along bank.	9/23/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	28.00-28.25	28.25 R1	28.25	42.33946968	-85.33593924	SUB 28.25 R1	307435.573N 12861315.187E	Heavy submerged oil observed. Oxbow; deep channel with depositional area adjacent	10/7/2010		Continue to Monitor					Y	aeration, water flushing and raking	Sign-off and Release 10/6/10	
E	28.25-28.50	28.45 L1	28.45 - South	42.33571365	-85.34090048	SUB 28.45 L1	306082.381N 12859958.130E	Heavy submerged oil observed. Approximately 2,600 square foot area.	9/23/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	

Division	Segment	Unique ID	Location (RDB, LDB, or Island)				GPS Coordinates**	Post Spill Baseline Description of Area	Last SOTF Observation Date	Code	Submerged Oil Team Recommendations	Tentative Inspection Frequency	Priority	Date of Last Inspection	Inspector	Cleanup Action Performed (Y/N)	Primary Cleanup Actions Performed	Observation	Actions Needed
				Longitude	Latitude	Comment													
E	28.50-28.75	28.50 L1, R1	28.5 North & South	42.336181688 (North) 42.3356160887 (South)	-85.3418248637 (North) -85.3420592795 (South)	SUB 28.5	306255.825N 12859710.193E (North) 306050.459N 12859644.430E (South)	Moderate submerged oil-very small area-shoreline	9/23/140		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	28.50-28.75	28.60 R1	28.6 North	42.33640401	-85.34394275	SUB 28.6	306343.477N 12859138.555E	Moderate submerged oil-very small area-shoreline	9/26/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	28.50-28.75	28.65 R1	28.65 North	42.33664388	-85.34476767	SUB 28.65	306433.474N 12858916.551E	Moderate-very small area-shoreline	9/26/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	28.50-28.75	28.75 L1, R1	28.75 North & South	42.3359418168 (North) 42.3354041797 (South)	-85.3458149165 (North) -85.3451269725 (South)	SUB 28.75	306180.938N 12858630.452E (North) 305982.865N 12858814.163E (South)	Moderate submerged oil observed-very small area-both shorelines	9/26/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	28.75-29.00	28.80 R1	28.8 North	42.33369522	-85.34583247	SUB 28.8	305362.349N 12858616.185E	Heavy submerged oil observed -Heavy, very small area2	9/26/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	28.75-29.00	28.90 L1	28.9 South	42.33315697	-85.34661059	SUB 28.9	305168.663N 12858403.527E	Heavy submerged oil observed-very small area-shoreline	9/13/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	29.00-29.25	29.15 R1	29.15 - North			SUB 29.15 R1		Moderate to Heavy submerged oil observed in oxbow. Approximately 1.7 acre area. No Oil Observed since October 2010	--		No Further Action					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	29.5-29.75	29.50 L1, R1	29.5 North & South	42.3296857989 (North) 42.3295120983 (South)	-85.3553076093 (North) - 85.354619945 (South)	SUB 29.50	303931.284N 12856037.290E (North) 303865.806N 12856222.479E (South)	Moderate submerged oil observed -very small area-both shorelines	9/26/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	30.00-30.25	30.00 R1	30			SUB 30.00 R1		Just north of milepost 30 and E2 dock. Sheen in silty sediment. Open water cove surrounded by silver maple wetland.	9/27/2010		No Further Action					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	30.25-30.50	30.25 R1	30.25 - North			SUB 30.25 R1		Included in site 33.3	--										

Division	Segment	Unique ID	Location (RDB, LDB, or Island)				GPS Coordinates**	Post Spill Baseline Description of Area	Last SOTF Observation Date	Code	Submerged Oil Team Recommendations	Tentative Inspection Frequency	Priority	Date of Last Inspection	Inspector	Cleanup Action Performed (Y/N)	Primary Cleanup Actions Performed	Observation	Actions Needed
				Longitude	Latitude	Comment													
E	30.25-30.50	30.30 R1	30.3 - North	42.32322279	-85.36386376	SUB 30.30 R1	301603.500N 12853695.973E	Moderate to Heavy submerged oil observed. Less than 9,000 square foot area.	9/27/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	30.50-40.00	30.75 L1	30.75 - South/East			SUB 30.75 R1		Moderate to Heavy submerged oil observed. Approximately 1.1 acre area. N oil observed since September 2010	--		No Further Action					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	31.00-31.25	31.00 R1	31	42.31676382	-85.36628003	SUB 31.00 R1	299257.650N 12853014.649E	Moderate submerged oil observed. Channel widens, slowing flow.	10/1/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	31.25-31.50	31.25 R1	31.25 North	42.31439436	-85.368825	SUB 31.25	298402.421N 12852316.116E	Moderate-Heavy submerged oil observed	10/1/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	31.25-31.50	31.3 L1	31.3 SouthEast	42.31339392	-85.36968503	SUB 31.3	298040.639N 12852079.181E	Moderate-Heavy submerged oil observed. Apex of a meander	10/1/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	31.50-31.75	31.60 R1	31.6 - South/East	42.30865412	-85.37076073	SUB 31.60 L1	296316.961N 12851767.658E	Moderate to Heavy submerged oil observed behind island. Approximately 3,000 square foot area.	10/1/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	31.75-32.00	31.80 L1	31.8 South	42.30605737	-85.37228851	SUB 31.8	295375.661N 12851343.134E	Heavy submerged oil observed behind tree falls, sparse area.	10/2/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	31.75-32.00	31.90 R1	31.90 North	42.30569464	-85.37397346	SUB 31.9	295248.933N 12850885.803E	Moderate to Heavy submerged oil observed behind tree falls, sparse area.	10/2/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	31.75-32.00	31.90 L1	31.9 South	42.30533191	-85.37354052	SUB 31.9	295115.356N 12851001.325E	Heavy submerged oil observed behind tree falls, sparse area.	10/2/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	32.00-32.25	32.00 L1, R1	32 - 32.25 - N and S	42.305419668 (North) 42.3050496257 (South)	-85.3745877606 (North) -85.3744243691 (South)	SUB 32.00 R1	295150.723N 12850718.443E (North) 295015.354N 12850761.024E (South)	Moderate-heavy submerged oil observed behind tree falls, sparse area. Deposits spotty.	10/2/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	32.50-32.75	32.75 R1	32.75 NW	42.30116634	-85.38556333	SUB 32.75 L1	293636.585N 12847730.955E	Moderate to heavy submerged oil observed adjacent to shoreline	10/3/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	33.00-33.25	33.00 R1	33A	42.29879103	-85.38610158	SUB 33.00 R1	292772.806N 12847574.876E	Heavy submerged oil observed. Backwater	10/14/2010		Continue to Monitor					Y	aeration and raking	Sign-off and Release 9/29/10	
E	33.00-33.25	33.00 L1	33B	42.29700662	-85.38696746	SUB 33.00 R1	292125.422N 12847332.765E	Channel on North Bank; two depositional coves	10/14/2010		Continue to Monitor					Y	aeration and raking	Sign-off and Release 9/29/10	
E	33.00-33.25	33.25 R1	33.25	42.29552941	-85.38843476	SUB 33.25 R1	291591.953N 12846929.295E	Heavy submerged oil observed. Water is 6 inches or less with fine sand and organic but there is some sheen in sediment. Heavy sheen on sediment.	10/15/2010		Continue to Monitor					Y	aeration and raking	Sign-off and Release 9/29/10	
E	33.25-33.50	33.30 L1	33.3 - South			SUB 33.30 L1		Non-continuous ponds. Referred for overbank evaluation.	--										
E	33.50-34.00	33.50	33.5	42.29356652	-85.39065913	SUB 33.50	290884.004N 12846318.840E	oil observed intermittently in channel	10/3/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	33.50-34.00	33.75 R1	33.75 - North	42.29128482	-85.39601821	SUB 33.75 R1	290070.254N 12844858.851E	Moderate to Heavy submerged oil observed. Less than 5,000 square foot area.	10/3/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	34.00-34.25	34.00 R1	34 - North	42.28952966	-85.39966308	SUB 34.00 R1	289442.771N 12843864.899E	Moderate to heavy submerged oil observed. Backwater due to bridge.	10/4/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	35.50-35.75	35.60 L1	35.60 - South/East	42.28267286	-85.42009308	SUB 35.60 L1	287012.717N 12838306.237E	Moderate to heavy submerged oil observed. Less than 5,000 square foot area.	9/22/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.	
E	35.75-36.00	35.75 R1	35.75/36			SUB 35.75 R1		Included in site 35.8 North/West	9/22/2010										

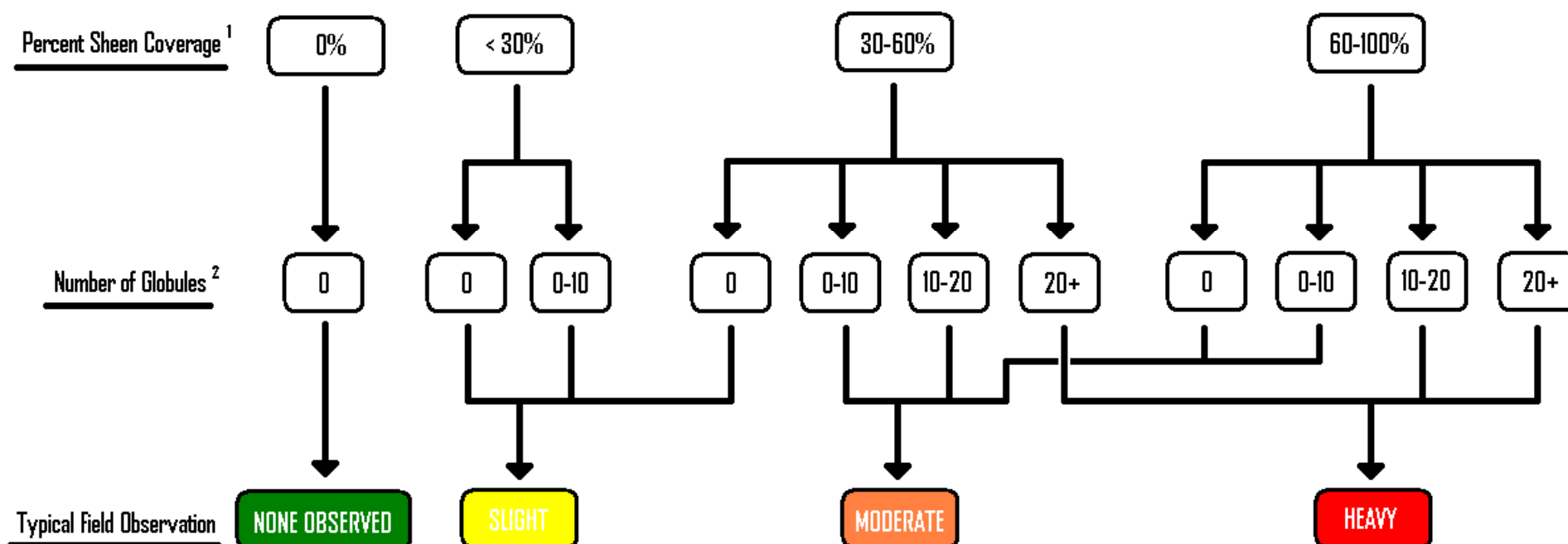
Division	Segment	Unique ID	Location (RDB, LDB, or Island)	Longitude	Latitude	Comment	GPS Coordinates**	Post Spill Baseline Description of Area	Last SOTF Observation Date	Code	Submerged Oil Team Recommendations	Tentative Inspection Frequency	Priority	Date of Last Inspection	Inspector	Cleanup Action Performed (Y/N)	Primary Cleanup Actions Performed	Observation	Actions Needed	
E	35.75-36.00	35.80 R1	35.8 - North/West (35.75/36)	42.28081239	-85.42061378	SUB 35.80 R1	286336.547N 12838156.858E	Moderate to heavy submerged oil observed. Approximately 1/2 acre area.	9/22/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.		
E	35.75-36.00	36.00 R1	36			SUB 36.00 R1		included in site 36.1	9/14/2010											
E	36.00-36.25	36.10 R1	36.1 - North/West (36)	42.27923466	-85.42144954	SUB 36.10 R1	285764.469N 12837923.506E	Moderate to heavy submerged oil observed in backwater areaa. Less than 9,000 square foot area.	9/14/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.		
E	36.00-36.25	36.25 L1	36.25			SUB 36.25 L1		Moderate to heavy submerged oil observed. Over flow channel. No oil observed since October 2010	--		No Further Action					N		Degradation and bioattenuation expected to be sufficient treatment.		
E	36.50-36.75	36.50 L1	36.5 to 36.75	42.28040871	-85.42908533	SUB 36.50 L1	286218.261N 12835862.685E	Moderate to heavy submerged oil observed . Pontedaria marsh along SE bank.	10/4/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.		
E	36.50-36.75	36.6 L1	36.6 South	42.28001087	-85.42959432	SUB 36.6	286075.033N 12835723.125E	Moderate-Heavy submerged oil observed. Adjacent to shoreline	10/4/2010		Inspect after boom has been removed					N		Degradation and bioattenuation expected to be sufficient treatment.		
E	36.75-37.00	36.8 R1	36.8 North	42.27859505	-85.4350119	SUB 36.8	285577.678N 12834250.618E	Moderate-Heavy submerged oil observed. Adjacent to shoreline	10/4/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.		
E	37.00-37.50	37.75 Delta	37-37.5 Delta(1)	42.27622559	-85.43583098	SUB 37.75	284717.089N 12834018.012E	Some sheen observed when sediments were disturbed. Wetlands are vegetated with purple loosestrife, an exotic invasive species.	10/25/2010		Continue to Monitor					Y	water flushing	Sign off and Released 10/23/10		
E	37.00-37.50		37-37.5 Delta(2)	42.27509644	-85.43645113		284307.771N 12833844.964E		10/28/2010		Continue to Monitor					Y	water flushing	Sign off and Released 10/23/10		
E	37.00-37.50		37-37.5 Delta(3)	42.27661757	-85.43903706		284870.958N 12833152.235E		10/25/2010		Continue to Monitor					Y	water flushing	Sign off and Released 10/23/10		
E	37.00-37.50		37-37.5 Delta(4)	42.27753025	-85.43219195		285180.009N 12835008.783E		10/25/2010		Continue to Monitor					Y	water flushing and air raking	Sign off and Released 10/23/10		
E	37.00-37.50		37-37.5 Delta(5)	42.2774893	-85.43502945		285174.817N 12834240.755E		10/25/2010		NA - Seasonal Spot Check					N		Degradation and bioattenuation expected to be sufficient treatment.		
E	37.00-37.50		37-37.5 Delta(6)	42.2769335	-85.43676121		284978.242N 12833769.561E		10/28/2010		Continue to Monitor					Y	water flushing	Sign off and Released 10/23/10		
E	37.00-37.50		37-37.5 Delta(7a)	42.27434757	-85.43927693		284044.623N 12833076.786E		10/28/2010		Continue to Monitor					Y	water flushing	Sign off and Released 10/23/10		
E	37.00-37.50		37-37.5 Delta(7b)	42.27438267	-85.44207348		284067.069N 12832320.155E		10/28/2010		Continue to Monitor					Y	water flushing	Sign off and Released 10/23/10		
E	37.00-37.50		37-37.5 Delta(7c)	42.27554108	-85.43751007		284473.436N 12833560.460E		10/28/2010		NA - Seasonal Spot Check						N		Degradation and bioattenuation expected to be sufficient treatment.	
E	37.00-37.50		37-37.5 Delta(7d)	42.2752076	-85.438335		284354.761N 12833335.679E		10/28/2010		NA - Seasonal Spot Check						N		Degradation and bioattenuation expected to be sufficient treatment.	
E	37.00-37.50		37-37.5 Delta(7e)	42.27569319	-85.44103794		284541.027N 12832606.484E		10/28/2010		NA - Seasonal Spot Check						N		Degradation and bioattenuation expected to be sufficient treatment.	
E	37.00-37.50		37-37.5 Delta(7f)	42.27557033	-85.44444001		284508.026N 12831685.270E		10/28/2010		NA - Seasonal Spot Check						N		Degradation and bioattenuation expected to be sufficient treatment.	
E	37.75-38.00	37.75 R1	37.75 North			SUB 37.75 R1		Moderate- Heavy submerged oil observed, adjacent to shoreline Fine sand, clear water; thick growth of SAV (coontail). Sediment sheen observed. No oil observed since October 2010	--		No Further Action					N		Degradation and bioattenuation expected to be sufficient treatment.		
E	39.75-40.00	39.75 R1	39.75 North			SUB 39.75 R1		Low quantities of sheen; little risk of re-entrainment. No oil observed since October 2010	--		No Further Action					N		Degradation and bioattenuation expected to be sufficient treatment.		
E	39.75-40.00	39.75 L1	39.75 South			SUB 39.75 L1		Low quantities of sheen; little risk of re-entrainment. No oil observed since October 2010	--		No Further Action					N		Degradation and bioattenuation expected to be sufficient treatment.		
*The GPS coordinates are State Plane Michigan South and international feet.																				
The Lat and Long is WGS 84.																				
Maintenance Codes																			Priority Codes	
: Recover any free product																			High = Maintenance actions should be addressed as soon as possible	
: Aerate either by raking or spike if needed																			Medium = Actions can be taken now but are not urgent	
: Boom maintenance: Clean hard boom;																			Low = General maintenance, continue monitoring with periodic evaluation	
Replace or re-arrange absorbent boom																				
Maintenance/clean collection points																				
: Pom-pom/absorbent pad maintenance																			No primary treatment performed	
: Visually inspect																			Actively Treated	
: Develop future remediation plan for approval																				
: Dewater as appropriate																				
: Carefully scrape surface soil when dry																				

Figure 1

Submerged Oil Field Observation Flowchart

Figure 1

Submerged Oil Field Observation Flowchart

**Notes:**

1. Percent coverage of 1 square yard
2. Number of globules per square yard